

ISS

CLI User Manual_Vol2

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Chapter

18

STP

STP (Spanning-Tree Protocol) is a link management protocol that provides path redundancy while preventing undesirable loops in the network that are created by multiple active paths between stations. To establish path redundancy, STP creates a tree that spans all of the switches in an extended network, forcing redundant paths into a standby or blocked state.

For an Ethernet network to function properly, only one active path should exist between two stations. Multiple active paths between stations in a bridged network can cause loops in which Ethernet frames can endlessly circulate. STP logically breaks such loops and prevents looping traffic from clogging the network. The dynamic control of the topology provides continued network operation in the presence of redundant or unintended looping paths.



The list of CLI commands for the configuration of STP is common to both SI and MI except for a difference in the prompt that appears for the switch with MI support.

The prompt for the global configuration mode is,

```
iss(config-switch)# spanning-tree mode rst
```

The STP functionality is realized in the network using one of the three following STPs:

- RSTP
- MSTP
- PVRST+

RSTP

Interface Masters RSTP is a portable implementation of the IEEE 802.1D standard. It provides rapid recovery of connectivity following the failure of a bridge/bridge port or a LAN. It reduces the time to reconfigure the active topology of the network when physical topology or topology configuration parameters changes. It provides increased availability of MAC service when there is a reconfiguration or failure of components in a bridged LAN. It can interoperate with legacy STP bridges without any change in the configuration.

The list of common STP commands for the configuration of STP (RSTP / MSTP / PVRST) is as follows:

- shutdown spanning-tree
- spanning-tree
- spanning-tree provider
- spanning-tree mode
- spanning-tree compatibility
- spanning-tree timers
- spanning-tree transmit hold-count
- clear spanning-tree counters
- spanning-tree pathcost dynamic
- spanning-tree priority
- spanning-tree auto-edge
- spanning-tree - Properties of an interface
- spanning-tree portfast - disable | trunk
- spanning-tree portfast - bpduguard default | bpduguarddefault | default
- spanning-tree restricted-role
- spanning-tree restricted-tcn
- spanning-tree layer2-gateway-port
- spanning-tree bpdu-receive
- spanning-tree bpdu-transmit
- spanning-tree loop-guard
- spanning-tree – Pseudoroot configuration
- debug spanning-tree
- clear spanning-tree detected protocols
- show spanning-tree - Summary, Blockedports, Pathcost, Redundancy
- show spanning-tree detail
- show spanning-tree active
- show spanning-tree interface
- show spanning-tree root

- show spanning-tree bridge
- show spanning-tree – layer 2 gateway port
- show customer spanning-tree

MSTP

Interface Masters MSTP is a portable implementation of the IEEE 802.1s standard. It is used to configure spanning tree on per VLAN basis or multiple VLANs per spanning tree. It allows you to build several MST over VLAN trunks, and group or associate VLANs to spanning tree instances, so the topology of one instance is independent of the other instance. It provides multiple forwarding paths for data traffic and enables load balancing. It improves the overall network fault tolerance, as failure in one instance does not affect the other instances.

The list of commands for the configuration of MSTP is as follows:

- spanning-tree mst max-hops
- spanning-tree mst configuration
- spanning-tree mst max-instance
- spanning-tree mst root
- spanning-tree mst forward-time
- spanning-tree mst max-age
- name
- revision
- instance
- spanning-tree mst- Properties of an interface for MSTP
- spanning-tree mst hello-time
- show spanning-tree mst - CIST or specified mst Instance
- show spanning-tree mst configuration
- show spanning-tree mst - Port Specific Configuration

PVRST+

Interface Masters PVRST+ is an enhancement of RSTP, which works in conjunction with VLAN to provide better control over traffic in the network. It maintains a separate spanning tree for each active VLAN in the network, thus providing load balancing through multiple instances of spanning tree, fault tolerance and rapid reconfiguration support through RSTP.



For each VLAN, a spanning-tree instance is created. Number of spanning-tree instances supported in PVRST depends on the number of instances supported by the hardware. PVRST operates only on supported instances.

The PVRST related commands are available only if the switch PVRST_WANTED is set as yes during compilation of the exe.

The list of commands for the configuration of PVRST+ is as follows:

- spanning-tree vlan
- spanning-tree bpduguard
- spanning-tree guard
- spanning-tree encap
- spanning-tree vlan status
- spanning-tree vlan port-priority
- spanning-tree vlan cost
- show spanning-tree vlan - Summary, Blockedports, Pathcost
- show spanning-tree vlan - bridge
- show spanning-tree vlan - root
- show spanning-tree vlan - interface

18.1 STP Commands Common for RSTP, MSTP and PVRST+

This section describes all spanning tree protocol related commands that are common for all kinds of STPs.

18.1.1 shutdown spanning-tree

This command shuts down spanning tree functionality in the switch. The switch does not execute any kind of STP to form a loop free topology in the Ethernet network and operates with the existing topology structure.

shutdown spanning-tree

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Spanning tree MSTP is started and enabled in the switch.

Example `iss(config)# shutdown spanning-tree`

Related Commands

- **base bridge-mode** - Configures the mode in which the VLAN feature should operate on the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree auto-edge** - Enables automatic detection of Edge port parameter of an interface.

- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree - layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **spanning-tree mst configuration** - Enters into MST configuration mode, where instance specific and MST region configuration can be done.
- **spanning-tree mst max-instance** - Configures the maximum number of active MSTIs that can be created.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst configuration** - Displays multiple spanning tree

instance related information.

- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.
- **spanning-tree guard** - Configures the various PVRST guard features such as root guard, in a port.
- **spanning-tree encaps** - Configures the encapsulation type to be used in an interface.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - bridge** - Displays the PVRT related information of the bridge for the specified VLAN ID.
- **show spanning-tree vlan - root** - Displays the PVRT related information of the root, for the specified VLAN ID.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.2 spanning-tree

This command enables the spanning tree operation in the switch for the selected spanning tree mode.

The no form of this command disables the spanning tree operation in the switch. The spanning tree operation is automatically enabled in the switch, once the spanning tree mode is changed.

Spanning tree operation provides path redundancy while preventing undesirable loops in the network that are created by multiple active paths between stations. It logically breaks such loops and prevents looping traffic from clogging the network.

spanning-tree

no spanning-tree

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Spanning tree MSTP is started and enabled in the switch.

Example `iss(config)#spanning-tree`



The spanning tree operation can be enabled in the switch only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.3 spanning-tree provider

This command enables the provider spanning tree operation and the no form of the command disables the provider spanning tree operation.

spanning-tree provider

no spanning-tree provider

Mode Global Configuration Mode

Package Metro

Defaults Spanning tree enabled is MSTP

Example `iss(config)#spanning-tree provider`

Related Commands

- **show spanning-tree detail** - Displays detailed spanning tree information
- **show spanning-tree active** - Displays spanning tree information of active ports

18.1.4 spanning-tree mode

This command sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. The current selected type of spanning tree is enabled and the existing spanning tree type is disabled in the switch.

If switch PVRST_WANTED is set as yes during compilation of exe:

```
spanning-tree mode {mst|rst|pvrst|pvst|rapid-pvst}
```

If switch PVRST_WANTED is set as no during compilation of exe:

```
spanning-tree mode {mst|rst}
```

Syntax Description

mst

- Configures the switch to execute MSTP for preventing undesirable loops.
MSTP configures spanning tree on per VLAN basis or multiple VLANs per spanning tree.
The mode cannot be set as mst, if the base bridge mode is configured as transparent bridging.

rst

- Configures the switch to execute RSTP for preventing undesirable loops.
RSTP provides rapid recovery of connectivity following the failure of a bridge/bridge port or a LAN.

pvrst

- Configures the switch to execute PVRST+ for preventing undesirable loops.
PVRST+ is an enhancement of RSTP which works in combination with VLAN to provide better control over traffic in the network.
The mode cannot be set as pvrst, if the base bridge mode is configured as transparent bridging.
The pvrst can be set as the spanning tree mode, only if the GVRP feature is disabled.

pvst

- Configures the switch to execute PVST for preventing undesirable loops.
PVST maintains separate spanning tree instance for each VLAN in the network and forwards VLAN trunk for only some VLANs.
The mode cannot be set as pvst, if the base bridge mode is configured as transparent bridging.
This feature is currently not supported.

- rapid-pvst**
- Configures the switch to execute rapid PVST for preventing undesirable loops.
- Rapid PVST combines the functionalities of RSTP and PVST, and creates a tree for each VLAN.
- The mode cannot be set as rapid-pvst, if the base bridge mode is configured as transparent bridging.
- This feature is currently not supported.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults mst

Example `iss(config)#spanning-tree mode rst`

Related Commands

- **base bridge-mode** - Configures the mode in which the VLAN feature should operate on the switch.
- **set gvrp disable** – Globally disables GVRP feature on all ports of a switch.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree auto-edge** - Enables automatic detection of Edge port parameter of an interface.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.

- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree - layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **spanning-tree mst max-instance** - Configures the maximum number of active MSTIs that can be created.
- **spanning-tree mst configuration** - Enters into MST configuration mode, where instance specific and MST region configuration can be done.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst configuration** - Displays multiple spanning tree instance related information.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **spanning-tree vlan** - Configures spanning tree related information on a per

VLAN basis.

- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.
- **spanning-tree guard** - Configures the various PVRST guard features such as root guard, in a port.
- **spanning-tree encap** - Configures the encapsulation type to be used in an interface.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - bridge** - Displays the PVRT related information of the bridge for the specified VLAN ID.
- **show spanning-tree vlan - root** - Displays the PVRT related information of the root, for the specified VLAN ID.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.5 spanning-tree compatibility

This command sets the STP compatibility version in the switch for all ports.

The no form of this command sets the STP compatibility version to its default value. The STP compatibility version is changed to its default value even if the spanning tree mode is changed.

The compatibility version allows the switch to temporarily operate (that is, till this configuration is reset manually) in other STP version even though the spanning tree mode is set as some other version. This configuration is useful during cases where spanning tree mode itself is not required to be changed.

spanning-tree compatibility {stp|rst|mst}

no spanning-tree compatibility

Syntax Description	stp	- Configures the switch to execute spanning tree operation as specified in IEEE 802.1D.
	rst	- Configures the switch to execute spanning tree operation as specified in IEEE 802.1w.
	mst	- Configures the switch to execute spanning tree operation as specified in IEEE 802.1s. The STP compatibility version cannot be set as mst, if the spanning tree mode is set as rst.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

- If STP mode is set as mst, then spanning tree compatibility is set as mst.
- If STP mode is set as rst, then spanning tree compatibility is set as rst.

Example `iss(config)#spanning-tree compatibility stp`



- The STP compatibility version can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- The STP compatibility version does not change the operation of the switch whose spanning tree mode is set as PVRST.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the

switch.

- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.

18.1.6 spanning-tree timers

This command sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.

The no form of this command resets the spanning tree timers to its default values. The spanning tree timers are reset to its default value, even if the spanning tree mode is changed.

```
spanning-tree {forward-time <seconds(4-30)> | hello-time <seconds(1-2)> | max-age <seconds(6-40)>}
```

```
no spanning-tree { forward-time | hello-time | max-age }
```

Syntax Description	forward-time	- Configures the number of seconds, a port waits before changing from the blocking state to the forwarding state This value ranges between 4 and 30 seconds. In MSTP, this time configuration is applied for IST root (that is, MSTI 0).
	hello-time	- Configures the time interval (in seconds) between two successive configuration BPDUs generated by the root switch. This value should be either 1 or 2 seconds. This value is configured on per-port basis for MSTP and is configured globally for RSTP.
	max-age	- Configures the maximum expected arrival time (in seconds) of hello BPDUs. STP information learned from network on any port is discarded, once the configured arrival time expires. The spanning tree topology is re-computed after this time interval. This value ranges between 6 and 40 seconds. In MSTP, this time configuration is applied for IST root (that is, MSTI 0).

Mode	Global Configuration Mode
Package	Workgroup, Enterprise and Metro

Defaults	forward-time	- 15 seconds
	hello-time	- 2 seconds

max-age - 20 seconds

Example

```
iss(config)#spanning-tree max-age 6
```



1. The values configured for the spanning tree timers should satisfy the following conditions:
 - $2 * (\text{forward-time} - 1) \geq \text{max-age}$, and
 - $\text{max-age} \geq 2 * (\text{hello-time} + 1)$
2. The STP timers can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
3. This spanning tree timer's configuration is not supported in PVRST mode.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface detail** - Displays detailed spanning tree related information for the specified port.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

18.1.7 spanning-tree transmit hold-count

This command sets the transmit hold-count value for the switch.

The no form of this command sets the transmit hold-count to its default value. The transmit hold-count is changed to its default value even if the spanning tree mode is changed.

The transmit hold count value is a counter that is used to limit the maximum transmission rate of the switch and to avoid flooding. This value specifies the maximum number of packets that can be sent in a given hello time interval. This value ranges between 1 and 10.

```
spanning-tree transmit hold-count <value (1-10)>
```

```
no spanning-tree transmit hold-count
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 6, if the spanning tree mode is set as mst.
3, if the spanning tree mode is set as rst or pvrst.

Example `iss(config)#spanning-tree transmit hold-count 5`



- The transmit hold-count value can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This transmit hold count value configuration is not supported in PVRST mode.

- Related Commands**
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
 - **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
 - **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
 - **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
 - **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.

18.1.8 clear spanning-tree counters

This command deletes all bridge and port level spanning tree statistics information.

For RSTP, the information contains number of:

- Transitions to forwarding state
- RSTP BPDU count received / transmitted
- Config BPDU count received / transmitted
- TCN BPDU count received / transmitted
- Invalid BPDU count transmitted
- Port protocol migration count

For MSTP, the information contains number of:

- Port forward transitions
- Port received BPDUs
- Port transmitted BPDUs
- Port invalid BPDUs received
- Port protocol migration count
- BPDUs sent / received for each MSTI

For PVRST, the information contains number of:

- Transitions to forwarding state
- PVRST BPDU count received / transmitted
- Config BPDU count received / transmitted
- TCN BPDU count received / transmitted
- Port protocol migration count

clear spanning-tree counters

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)# clear spanning-tree counters`



The statistics information can be deleted, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.

- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.9 spanning-tree pathcost dynamic

This command enables dynamic pathcost calculation feature in the switch.

The no form of this command disables dynamic pathcost calculation feature in the switch. The dynamic pathcost calculation feature is disabled, even if the spanning tree mode is changed.

The path cost of the port / MSTI is dynamically calculated. This feature is applied only for the ports that are not shutdown during the execution of STP. The calculated path cost is not changed based on the operational status of the port / for a MSTI, once calculated. The manually assigned / already calculated path cost is used even if the dynamic pathcost calculation feature is enabled in the switch.

spanning-tree pathcost dynamic [lag-speed]

no spanning-tree pathcost dynamic [lag-speed]

Syntax description	lag-speed	-	<p>Calculates the path cost for change in speed of the port. This feature is used for LA ports whose speed changes due to addition or deletion of ports from the port channel.</p> <p>The manually assigned path cost is used even if the lag speed feature is enabled in the switch, if the path cost is assigned manually.</p> <p>The lag speed feature can be enabled, only after enabling the dynamic pathcost calculation feature.</p>
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Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Dynamic pathcost calculation feature is disabled in the switch.

Example `iss(config)# spanning-tree pathcost dynamic`



The dynamic pathcost calculation feature can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch. • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • spanning-tree - Properties of an interface - Configures the port related spanning tree information for all kinds of STPs. • show spanning-tree - Summary, Blockedports, Pathcost, redundancy - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
-------------------------	--

- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.

18.1.10 spanning-tree priority

This command configures the priority value that is assigned to the switch.

The no form of this command resets the priority to its default value. The priority value is changed to its default value even if the spanning tree mode is changed.

In RSTP, this value is used during the election of root. In MSTP, this value is used during the election of CIST root, CIST regional root and IST root.

```
spanning-tree [mst <instance-id>] priority <value(0-61440)>
```

```
no spanning-tree [mst <instance-id(1-64)>] priority
```

Syntax Description	mst	<ul style="list-style-type: none"> - Configures the ID of MSTP instance already created in the switch. <p>This value ranges between 1 and 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs.</p> <p>This option is applicable, only if the spanning tree mode is set as mst.</p>
	priority	<ul style="list-style-type: none"> - Configures the priority value for the switch and for the MSTI, in RSTP and MSTP respectively. <p>This value ranges between 0 and 61440. The value should be set in steps of 4096, that is, you can set the value as 0, 4096, 8192, 12288 and so on.</p>

Mode	Global Configuration Mode
Package	Workgroup, Enterprise and Metro

Defaults	priority = 32768
-----------------	------------------

Example `iss(config)#spanning-tree priority 4096`



- The priority value can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This priority value configuration is not supported in PVRST mode.

Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch.
	<ul style="list-style-type: none"> • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the

switch.

- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **instance** - Creates an MST instance and maps it to VLANs.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

18.1.11 spanning-tree auto-edge

This command enables automatic detection of Edge port parameter of an interface.

The no form of this command disables automatic detection of Edge port parameter of an interface. The automatic detection of Edge port parameter is disabled, even if the spanning tree mode is changed.

Once automatic detection is enabled, the Edge port parameter is automatically detected and set. The port is set as edge port, if no BPDU is received on the port. The port is set as non-edge port, if any BPDU is received.

spanning-tree auto-edge

no spanning-tree auto-edge

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults Automatic detection of Edge port parameter of an interface is enabled.

Example `iss(config-if)# spanning-tree auto-edge`



The automatic detection of Edge port parameter can be configured in the switch, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.

18.1.12 spanning-tree - Properties of an interface

This command configures the port related spanning tree information for all kinds of STPs.

The no form of this command resets the port related spanning tree information to its default value. The port related spanning tree information is changed to its default value even if the spanning tree mode is changed.

```
spanning-tree {cost <value (0-200000000)> | disable | link-type {point-to-point | shared} | portfast | port-priority <value (0-240)>}
```

```
no spanning-tree {cost | disable | link-type | portfast | port-priority}
```

Syntax Description

- | | |
|------------------|--|
| cost | <ul style="list-style-type: none"> - Configures the port's path cost value that contributes to the path cost of paths containing this particular port. <p>The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port.</p> <p>This value ranges between 1 and 200000000.</p> <p>The configured path cost is used, even if the dynamic pathcost calculation feature or LAGG speed feature is enabled.</p> <p>This configuration is not supported for the spanning tree mode pvrst.</p> |
| disable | <ul style="list-style-type: none"> - Disables the spanning tree operation on the port. <p>The port does not take part in the execution of spanning tree operation for preventing undesirable loops in the network.</p> |
| link-type | <ul style="list-style-type: none"> - Configures the link status of the LAN segment attached to the port. The options available are: <ol style="list-style-type: none"> 1. point-to-point – The port is treated as if it is connected to a point-to-point link. 2. shared - The port is treated as if it is using a shared media connection. |
| portfast | <ul style="list-style-type: none"> - Configures the portfast feature in the port. This feature specifies that the port is connected to only one hosts and hence can rapidly transit to forwarding. <p>This feature can cause temporary bridging loops, if hubs, concentrators, switches, bridges and so on are connected to this port.</p> <p>This feature takes effect only when the interface is</p> |

shutdown.

- port-priority**
- Configures the priority value assigned to the port. This value is used during port role selection process.
 - This value ranges between 0 and 240.
 - This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48, and so on.
 - This configuration is not supported for the spanning tree mode pvrst.

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

- Defaults**
- cost
 - 200000 for all physical ports
 - 199999 for port channels
 - disable
 - Spanning tree operation is enabled in the port.
 - link-type
 - The port is considered to have a point-to-point link if:
 - It is an aggregator and all of its members can be aggregated.
 - The MAC entity is configured for full duplex operation, either manually or through auto negotiation process (that is, negotiation mode is set as **Auto**)
 - Otherwise port is considered to have a shared media connection
 - portfast
 - Portfast is disabled.
 - port-priority
 - 128

Example

```

iss(config-if)# spanning-tree cost 2200
iss(config-if)# spanning-tree link-type point-to-point
iss(config-if)# spanning-tree portfast
iss(config-if)# spanning-tree port-priority 32
  
```



The port-related spanning tree information can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.

18.1.13 spanning-tree portfast - disable | trunk

This command¹ configures the portfast mode, where the interface is immediately put into the forwarding state upon linkup without waiting for the timer to expire.

This command is a standardized implementation of the existing command; **spanning-tree - Properties of an interface**. It operates similar to the existing command.

```
spanning-tree portfast { disable | trunk}
```

Syntax Description	disable	- Disables PortFast on the interface.
	trunk	- Enables PortFast on the interface.
Mode	Global Configuration Mode	
Package	Workgroup, Enterprise and Metro	
Example	<pre>iss(config)# spanning-tree portfast trunk</pre>	
Related Command	show spanning-tree interface - Displays the spanning tree port specific configuration.	

¹ The spanning-tree portfast feature is currently not supported in the Global Configuration Mode.

18.1.14 spanning-tree portfast - bpdudfilter default | bpduguarddefault | default

This command¹ configures the portfast of the non-trunk ports as bpdudfilter default or bpduguard default or default.

This command is a standardized implementation of the existing command; **spanning-tree - Properties of an interface**. It operates similar to the existing command.

```
spanning-tree portfast {bpdudfilter default | bpduguard default | default}
```

```
no spanning-tree portfast {bpdudfilter default | bpduguard default | default}
```

Syntax Description	bpdudfilter default	- Enables BPDU filtering by default on all PortFast ports.
	bpduguard default	- Enables BPDU guard feature by default on all PortFast ports.
	default	- Enables PortFast by default on all access ports.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example iss(config)# spanning-tree portfast default

Related Command **show spanning-tree interface** - Displays the spanning tree port specific configuration.

18.1.15 spanning-tree restricted-role

This command enables the restricted role feature for a port.

The no form of this command disables the restricted role feature in the port. The restricted role feature is disabled, even if the spanning tree mode is changed or port is set as L2GP.

The restricted role feature blocks the port from being selected as a root port even if it has the best spanning tree priority vector. This port is selected as an alternate port after the root port is selected. This feature allows you to block switches external to a core region of the network from influencing the spanning tree active topology.

The blocking of port from being selected as a root port can cause lack of spanning tree connectivity.

spanning-tree restricted-role

no spanning-tree restricted-role

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults Restricted role feature is disabled in all ports.

Example `iss(config-if)# spanning-tree restricted-role`



- The restricted role feature can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This configuration is not supported in PVRST mode.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.1.16 spanning-tree restricted-tcn

This command enables the topology change guard / restricted TCN feature on a port.

The no form of this command disables the topology change guard / restricted TCN feature on the port. The topology change guard / restricted TCN feature is disabled, even if the spanning tree mode is changed or port is set as L2GP.

The restricted TCN feature blocks the port from propagating the received topology change notifications and topology changes to other ports. This feature allows you to block switches external to a core region of the network from causing address flushing in the region.

The blocking of port can cause temporary loss of connectivity after changes in a spanning tree active topology as a result of persistent incorrectly learnt station location information.

spanning-tree restricted-tcn

no spanning-tree restricted-tcn

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults Topology change guard / restricted TCN feature is disabled in all ports..

Example `iss(config-if)# spanning-tree restricted-tcn`



- The topology change guard / restricted TCN feature can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This configuration is not supported in PVRST mode.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.1.17 spanning-tree layer2-gateway-port

This command configures a port to operate as a L2GP.

The no form of this command configures the port to operate as a normal port. The port operates as normal port, even if the spanning tree mode is changed.

L2GP operates similar to that of the normal port operation but pretends to continuously receive BPDUs when admin state of the port is Up.

spanning-tree layer2-gateway-port

no spanning-tree layer2-gateway-port

Mode Interface Configuration mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults The port operates as a normal port.

Example `iss(config-if)# spanning-tree layer2-gateway-port`



- The port can be configured as L2GP, only if the BPDU transmit status, restricted role feature and restricted TCN feature of the port are disabled.
- The PIP or CBP ports cannot be set as L2GP.
- Ports with SISP enabled interfaces cannot be set as L2GP.
- The port state of the L2GP is always set as discarding.
- The topology change guard / restricted TCN feature can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **show spanning-tree - Summary, Blockedports, Pathcost**, redundancy - Displays spanning tree related information available in the switch for the current STP enabled in the switch.


- **show spanning-tree detail** – Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree - layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.18 spanning-tree bpdureceive

This command configures the processing status of the BPDUs received in a port. BPDUs are used to carry bridge related information that is used during spanning tree operation.

The processing status is reset to its default value, once the spanning tree mode is changed.

spanning-tree bpdureceive {enabled | disabled}

Syntax Description	enabled	- Allows normal processing of BPDUs received on the port.
	disabled	- Discards the BPDUs received on the port.
Mode	Interface configuration mode (Physical Interface Mode)	
Package	Workgroup, Enterprise and Metro	
Defaults	enabled	
Example	<pre>iss(config-if)# spanning-tree bpdureceive disabled</pre>	
	 The processing status of the received BPDUs can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.	
Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch. • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • show spanning-tree detail - Displays detailed spanning tree related information of the switch and all ports enabled in the switch. • show spanning-tree active detail - Displays detailed spanning tree related information of the switch and all ports enabled in the switch. • show spanning-tree interface - Displays the port related spanning tree information for the specified interface. 	

18.1.19 spanning-tree bpdutxmit

This command configures the BPDU transmission status of a port. BPDUs are used to carry bridge related information that is used during spanning tree operation.

The transmission status is reset to its default value, once the spanning tree mode is changed.

spanning-tree bpdutxmit {enabled | disabled}

Syntax Description	enabled	- Allows the transmission of BPDUs from the port.
	disabled	- Blocks the transmission of BPDUs from the port.

Mode Interface configuration mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults enabled

Example `iss(config-if)# spanning-tree bpdutxmit enabled`



- BPDU transmission status cannot be enabled on the port that is configured as L2GP.
- The BPDU transmission status can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.1.20 spanning-tree loop-guard

This command enables the loop guard feature in a port.

The no form of this command disables the loop guard feature in the port. The loop guard feature is disabled, even if the spanning tree mode is changed.

This feature prevents the alternative or root ports from becoming designated ports due to failure in a unidirectional link. This feature is useful when the neighbor bridge is faulty, that is, the bridge cannot send BPDUs but continues to send data traffic.

spanning-tree loop-guard

no spanning-tree loop-guard

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults Loop guard feature is disabled in all ports.

Example `iss(config-if)# spanning-tree loop-guard`



The loop guard feature can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.1.21 spanning-tree – Pseudoroot configuration

This command configures the pseudoroot related information for a port set as L2GP.

The no form of this command resets the pseudoroot related information to the currently available bridge related information.

The information contains pseudoroot priority and pseudoroot MAC address for the port. This configuration is not utilized in PVRST mode.

```
spanning-tree [mst <instance-id>] pseudoRootId priority <value(0-61440)> mac-  
address <ucast_mac>
```

```
no spanning-tree [mst <instance-id(1-64)>] pseudoRootId
```

Syntax Description	mst	<ul style="list-style-type: none"> - Configures the ID of MSTP instance already created in the switch. <p>This value ranges between 1 and 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs.</p> <p>This option is applicable, only if the spanning tree mode is set as mst.</p>
	priority	<ul style="list-style-type: none"> - Configures the priority of the pseudoroot. Port configured as L2GP uses this value in generated BPDUs as the root identifier. <p>This value ranges between 0 and 61440.</p> <p>The value should be set in steps of 4096, that is, you can set the value as 0, 4096, 8192, 12288 and so on.</p>
	mac-address	<ul style="list-style-type: none"> - Configures the unicast MAC address of the pseudoroot. Port configured as L2GP uses this value as its address.

Mode Interface configuration mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults	priority	- Priority value assigned to the switch.
	mac-address	- MAC address assigned to the switch.

Example

```
iss(config-if)# spanning-tree mst 1 pseudoRootId priority 8192  
mac-address 00:00:12:34:45:55
```



The pseudoroot related information can be configured, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree - layer 2 gateway port** - Displays spanning tree information for all L2GPs enabled in the switch.
- **instance** - Creates an MST instance and maps it to VLANs.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.

18.1.22 debug spanning-tree

This command enables the tracing of the STP module as per the configured debug levels. The trace statements are generated for the configured trace levels.

The no form of this command disables the tracing of the STP module as per the configured debug levels. The trace statements are not generated for the configured trace levels.

This command allows combination of debug levels to be configured (that is, more than one level of trace can be enabled or disabled). The debug levels are configured one after the other and not in single execution of the command.

```
debug spanning-tree { global | { all | errors | init-shut | management | memory
| bpdu | events | timer | state-machine { port-info | port-receive | port-
role-selection | role-transition | state-transition | protocol-migration |
topology-change | port-transmit | bridge-detection | pseudoInfo } | redundancy
| sem-variables} [switch <context_name>]}
```

```
no debug spanning-tree {global | {all | errors | init-shut | management |
memory | bpdu | events | timer | state-machine {port-info | port-receive |
port-role-selection | role-transition | state-transition | protocol-migration
| topology-change | port-transmit | bridge-detection | pseudoInfo } redundancy
| sem-variables} [switch <context_name>]}
```

Syntax Description	global²	- Generates debug statements for global traces. This trace is used for providing status of STP task initialization, memory-pool creation and event-reception in STP task.
	all	- Generates debug statements for all kinds of traces.
	errors	- Generates debug statements for all failure traces.
	init-shut	- Generates debug statements for init and shutdown traces. This trace is generated on failed and successful initialization and shutting down of STP related module and memory.
	management	- Generates debug statements for management traces. This trace is generated whenever you configure any of the STP features.
	memory	- Generates debug statements for memory related traces. This trace is generated on failed and successful allocation of memory for STP process.
	bpdu	- Generates debug statements for BPDU related traces. This trace is generated on failed and successful

² This parameter is specific to Multiple Instance.

	reception, transmission and processing of BPDUs.
timer	- Generates debug statements for timer module traces. This trace is generated on failed and successful start, stop and restart of STP timers.
events	- Generates debug statements for event handling traces. This trace is generated to denote events that are posted to STP configuration queue whenever you configure any of the STP features.
state machine	- Generates debug statements to denote the event and state of the selected SEM. The options are: <ul style="list-style-type: none"> • port-info - Generates debug statements for port information SEM. • port-receive - Generates debug statements for port receive SEM. • port-role-selection - Generates debug statements for role selection SEM. • role-transition - Generates debug statements for role transition SEM. • state-transition - Generates debug statements for state transition SEM. • protocol-migration - Generates debug statements for protocol migration SEM. • topology-change - Generates debug statements for topology change SEM. • port-transmit - Generates debug statements for port transmit SEM. • bridge-detection - Generates debug statements for bridge detection SEM. • pseudoInfo - Generates debug statements for port receive pseudo information SEM.
redundancy	- Generates debug statements for redundancy code flow traces. This trace is generated in standby node STP while taking backup of configuration information from active node.
sem-variables	- Generates debug statements for state machine variable changes traces. This trace is generated on failed and successful creation and deletion of semaphore.
switch	- Configures the tracing of the STP module for the specified context.

This value represents unique name of the switch context.

This value is a string whose maximum size is 32.

This parameter is specific to multiple instance feature.

Mode	Privileged EXEC Mode
Package	Workgroup, Enterprise and Metro
Defaults	Tracing of the STP module is disabled
Example	<code>iss# debug spanning-tree all</code>

18.1.23 clear spanning-tree detected protocols

This command restarts the protocol migration process on all interfaces in the switch and forces renegotiation with the neighboring switches.

```
clear spanning-tree detected protocols [{interface <interface-type>
<interface-id> | switch <context_name>}]
```

Syntax Description	interface	<ul style="list-style-type: none"> - Restarts the protocol migration process on the specified interface. <p>The details to be provided are:</p> <ul style="list-style-type: none"> • <interface-type> - Sets the type of interface. The interface can be: <ol style="list-style-type: none"> 1. fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer up to 100 Megabits per second. 2. gigabitethernet – A version of LAN standard architecture that supports data transfer up to 1 Gigabit per second. 3. extreme-ethernet – A version of Ethernet that supports data transfer up to 10 Gigabits per second. This Ethernet supports only full duplex links. 4. internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. 5. port-channel – Logical interface that represents an aggregator which contains several ports aggregated together. • <interface-id> - Sets the interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than internal-lan and port-channel. Only i-lan or port-channel ID is provided, for interface types internal-lan and port-channel.
	switch	<ul style="list-style-type: none"> - Restarts the protocol migration process for the specified context. <p>This value represents unique name of the switch context.</p> <p>This value is a string whose maximum size is 32.</p> <p>This parameter is specific to multiple instance feature.</p>
Mode	Privileged EXEC Mode	

Package Workgroup, Enterprise and Metro

Example

```
iss# clear spanning-tree detected protocols interface  
gigabitethernet 0/1
```

Related Commands

- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.1.24 show spanning-tree - Summary, Blockedports, Pathcost, Redundancy

This command displays spanning tree related information available in the switch for the current STP enabled in the switch.

The information contain priority, address and timer details for root and bridge, status of dynamic pathcost calculation feature, status of spanning tree function, STP compatibility version used, configured spanning tree mode, bridge and port level spanning tree statistics information, and details of ports enabled in the switch. The port details contain port ID, port role, port state, port cost, port priority and link type.

If switch L2RED WANTED is set as no during compilation of exe:

```
show spanning-tree [{ summary | blockedports | pathcost method }] [ switch
<context_name>]
```

If switch L2RED WANTED is set as yes during compilation of exe:

```
show spanning-tree [{ summary | blockedports | pathcost method | redundancy }]
[ switch <context_name>]
```

Syntax Description	summary	<ul style="list-style-type: none"> - Displays the currently used STP, applied path cost method and port details such as port ID, port role, port state and port status. <p>This option cannot be executed in the PVRST mode.</p>
	blockedports	<ul style="list-style-type: none"> - Displays the list of ports in blocked state and the total number of blocked ports. <p>This option cannot be executed in the PVRST mode.</p>
	pathcost method	<ul style="list-style-type: none"> - Displays the port pathcost method configured for the switch.
	redundancy	<ul style="list-style-type: none"> - Displays the port role and port state, and dumps the STP port related information.
	switch	<ul style="list-style-type: none"> - Displays the STP related information in the switch, for the specified context. <p>This value represents unique name of the switch context.</p> <p>This value is a string whose maximum size is 32.</p> <p>This parameter is specific to multiple instance feature.</p>
Mode	Privileged EXEC Mode	

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree
```

```
Root Id          Priority 32768
                Address 00:01:02:03:04:01
                Cost 0
                Port 0 [0]
                This bridge is the root
                Max age 20 Sec, forward delay 15 Sec
```

```
MST00
```

```
Spanning tree Protocol has been enabled
```

```
MST00 is executing the mstp compatible Multiple Spanning Tree
Protocol
```

```
Bridge Id          Priority 32768
                Address 00:01:02:03:04:01
                Max age is 20 sec, forward delay is 15 sec
                Dynamic Path Cost is Disabled
```

Name	Role	State	Cost	Prio	Type
Gi0/1	Designated	Forwarding	200000	128	SharedLan
Gi0/2	Designated	Forwarding	200000	128	SharedLan
Gi0/3	Designated	Forwarding	200000	128	SharedLan
Gi0/4	Designated	Forwarding	200000	128	SharedLan
Gi0/5	Designated	Forwarding	200000	128	SharedLan
Gi0/6	Designated	Forwarding	200000	128	SharedLan
Gi0/7	Designated	Forwarding	200000	128	SharedLan

```
iss# show spanning-tree blockedports
```

```
Blocked Interfaces List:
```

```
The Number of Blocked Ports in the system is :1
```

```
iss# show spanning-tree pathcost method
```

```
Spanning Tree port pathcost method is Long
```

```
iss# show spanning-tree summary
```

```
Spanning tree enabled protocol is RSTP
Spanning Tree port pathcost method is Long
```

```
RSTP Port Roles and States
```

Port-Index	Port-Role	Port-State	Port-Status
1	Designated	Forwarding	Enabled
2	Designated	Forwarding	Enabled
3	Designated	Forwarding	Enabled
4	Designated	Forwarding	Enabled

5	Designated	Forwarding	Enabled
6	Designated	Forwarding	Enabled
7	Designated	Forwarding	Enabled
8	Designated	Forwarding	Enabled

```
iss# show spanning-tree redundancy
```

```
Port Role/State for Instance 0 Port 1
```

```
=====
```

```
Port Role 3 Port State 5
```

```
Port Role/State for Instance 0 Port 2
```

```
=====
```

```
Port Role 1 Port State 2
```

```
Dumping Data On Port 1
```

```
-----
```

```
RootId 0:00:11:22:33:44:55
```

```
Designated BrId 0:00:11:22:33:44:55
```

```
Root path Cost 0
```

```
Length 0
```

```
Protocol Id 0
```

```
Port Id 8001
```

```
Message Age 0
```

```
Max Age 14
```

```
Hello Time 2
```

```
Fwd Delay Time f
```

```
Dest Addr 00:00:00:00:00:00
```

```
Src Addr 00:00:00:00:00:00
```

```
Version Length 0
```

```
Version 2
```

```
BPDU Type 2
```

```
Flags e
```

```
Dumping Data On Port 2
```

```
-----
```

```
RootId 0:00:11:22:33:44:55
```

```
Designated BrId 0:00:11:22:33:44:55
```

```
Root path Cost 0
```

```
Length 0
```

```
Protocol Id 0
```

```
Port Id 8002
```

```
Message Age 0
```

```
Max Age 14
```

```
Hello Time 2
```

```
Fwd Delay Time f
```

```
Dest Addr 00:00:00:00:00:00
```

```
Src Addr 00:00:00:00:00:00
```

```
Version Length 0
```

```
Version 2
```

```
BPDU Type 2
```

```
Flags e
```

```
Instance 0 Port 1
```

```
=====
```

```
Expected FdWile expiry time 0
```

```
Expected rcvdInfo exp Time 4654
```



```

Expected rrWhile exp Time 0
Expected rbWhile exp Time 0
Expected tcWhile exp Time 0
Instance 0 Port 1
TCN Var 1
STP Version 1
Proposing Flag 0
Info Is 4

Instance 0 Port 2
=====
Expected FdWile expiry time 0
Expected rcvdInfo exp Time 4656
Expected rrWhile exp Time 0
Expected rbWhile exp Time 0
Expected tcWhile exp Time 0
Instance 0 Port 2
TCN Var 1
STP Version 1
Proposing Flag 0
Info Is 4

```

Multiple Instance:

```
iss# show spanning-tree
```

```
Switch default
```

```

Root Id          Priority    32768
      Address      00:01:02:03:04:01
      Cost         0
      Port         0 [0]
      This bridge is the root
      Max age 20 Sec, forward delay 15 Sec

```

```
MST00
```

```
Spanning tree Protocol Enabled.
```

```
S-VLAN Component: MST00 is executing the mstp compatible Multiple
Spanning Tree
```

```
Protocol
```

```

Bridge Id          Priority    32768
      Address      00:01:02:03:04:01
      Max age is 20 sec, forward delay is 15 sec

```

Name	Role	State	Cost	Prio	Type
----	----	-----	----	----	-----
Gi0/1	Disabled	Discarding	200000	128	SharedLan
Gi0/2	Designated	Forwarding	200000	128	SharedLan
Gi0/3	Designated	Forwarding	200000	128	SharedLan
Gi0/4	Designated	Forwarding	200000	128	SharedLan
Gi0/5	Designated	Forwarding	200000	128	SharedLan
Gi0/6	Designated	Forwarding	200000	128	SharedLan
Gi0/7	Designated	Forwarding	200000	128	SharedLan

```

iss# show spanning-tree summary
Switch - default

```

```
Spanning Tree port pathcost method is Long
Spanning tree enabled protocol is MSTP
```

```
MST00 Port Roles and States
```

Port-Index	Port-Role	Port-State	Port-Status
49	Disabled	Forwarding	Disabled

```
Switch - cust1
```

```
Spanning Tree port pathcost method is Long
Spanning tree enabled protocol is MSTP
```

```
MST00 Port Roles and States
```

Port-Index	Port-Role	Port-State	Port-Status
1	Designated	Forwarding	Enabled
2	Root	Forwarding	Enabled
3	Designated	Forwarding	Enabled
4	Disabled	Discarding	Enabled
5	Disabled	Discarding	Enabled
6	Disabled	Discarding	Enabled

```
Switch - cust2
```

```
Spanning Tree port pathcost method is Long
Spanning tree enabled protocol is MSTP
```

```
MST00 Port Roles and States
```

Port-Index	Port-Role	Port-State	Port-Status
7	Designated	Forwarding	Enabled
8	Root	Forwarding	Enabled
9	Alternate	Discarding	Enabled
10	Disabled	Discarding	Enabled
11	Disabled	Discarding	Enabled
12	Disabled	Discarding	Enabled



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface / VLAN interface / port-channel interface / tunnel interface / OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.

- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.25 show spanning-tree detail

This command displays detailed spanning tree related information of the switch and all ports enabled in the switch.

The information contains status of spanning tree operation, current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port level spanning tree statistics information, transmit hold-count value, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role and portfast features.

show spanning-tree detail [switch <context_name>]

Syntax Description	switch	- Displays detailed spanning tree related information, for the specified context. This value represents unique name of the switch context. This value is a string whose maximum size is 32. This parameter is specific to multiple instance feature.
---------------------------	---------------	---

Mode	Privileged EXEC Mode
-------------	----------------------

Package	Workgroup, Enterprise and Metro
----------------	---------------------------------

Example	Single Instance
----------------	------------------------

```
iss# show spanning-tree detail
```

```
Spanning tree Protocol Enabled.
```

```
Bridge is executing the rstp compatible Spanning Tree Protocol
Bridge Identifier has priority 32768, Address 00:01:02:03:04:01
Configured Hello time 2 sec, Max Age 20 sec, Forward Delay 15 sec
Dynamic Path Cost Disabled
We are the root of the spanning tree
Number of Topology Changes 0
Time since topology Change 0 seconds ago
Transmit Hold-Count 6
Max Age 20 Sec, Forward Delay 15 Sec
Hello Time 2 Sec
```

```
Port 1 [Gi0/1] is Designated, Discarding
Port PathCost 200000, Port Priority 128, Port Identifier 128.1
Designated Root has priority 32768, address 00:01:02:03:04:01
Designated Bridge has priority 32768, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
No of Transitions to forwarding State :0
PortFast is disabled
Link Type is Shared
BPDUs : sent 3 , recieved 0
Timers: Hello - 1, Forward Delay - 14, Topology Change - 0
Restricted Role is disabled.
```

```
Restricted TCN is disabled.
bpdu-transmit enabled
bpdu-receive enabled
```

Multiple Instance:

```
iss# show spanning-tree detail switch default
```

```
Switch default
```

```
MST00 is executing the mstp compatible Multiple Spanning Tree
Protocol
Bridge Identifier has Priority 32768, Address 00:51:02:03:04:05
Configured Max age 20 sec, Forward delay 15 sec
Configured Hello Time 2 sec
We are root of the spanning tree
Current Root has priority 32768, address 00:51:02:03:04:05
cost of root path is 0
Number of Topology Changes 1, Time since topology Change 82
seconds ago
Transmit Hold-Count 3
Times : Max age 20 Sec, Forward delay 15 Sec

Port 1 [Gi0/1] of MST00 is Designated, Forwarding
Gi0/1 is operating in the MSTP Mode
Port path cost 200000, Port priority 128,
Port Identifier 128.1. Port HelloTime 2,
Timers: Hello - 0, Forward Delay - 0, Topology Change - 0
Designated root has priority 32768, address 00:51:02:03:04:05
Designated Bridge has priority 32768, address 00:51:02:03:04:05
Designated Port Id is 128.1, Designated pathcost is 0
Operational Forward delay 15, Max age 20
Number of Transitions to forwarding State : 1
PortFast is disabled
Link Type is Shared
BPDUs : sent 58, recieved 0
Restricted Role is disabled.
Restricted TCN is disabled.
```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface / VLAN interface / port-channel interface / tunnel interface / OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the

switch for all ports.

- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.26 show spanning-tree active

This command displays spanning tree related information available in the switch for the current STP enabled in the switch.

The information contains priority, address and timer details for root and bridge, status of dynamic pathcost calculation feature, status of spanning tree function, STP compatibility version used, configured spanning tree mode, bridge and port level spanning tree statistics information, and details of ports enabled in the switch. The port details contain port ID, port role, port state, port cost, port priority and link type.

show spanning-tree active [detail] [switch <context_name>]

Syntax Description

detail

- Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- The information contains status of spanning tree operation, current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port level spanning tree statistics information, transmit hold-count value, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role and portfast features.

switch

- Displays spanning tree related information available in the switch, for the specified context.
- This value represents unique name of the switch context.
- This value is a string whose maximum size is 32.
- This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree active
```

```

Root Id      Priority    32768
Address      00:01:02:03:04:01
Cost         200000
Port         1 [Gi0/1]
Max age 20 Sec, forward delay 15 Sec

```

```
MST00
```

```
Spanning tree Protocol has been enabled
```

```

MST00 is executing the mstp compatible Multiple Spanning Tree
Protocol
Bridge Id      Priority    32768

```

```

Address 00:02:02:03:04:01
Max age is 20 sec, forward delay is 15 sec
Dynamic Path Cost is Disabled
Name      Role      State      Cost      Prio      Type
----      -
Gi0/1     Root      Forwarding 200000    128      SharedLan

```

Multiple Instance:

```
iss# show spanning-tree active switch default
```

```
Switch default
```

```

Root Id      Priority 32768
Address      00:51:02:03:04:05
Cost         0
Port         0 [0]
This bridge is the root
Max age 20 Sec, forward delay 15 Sec

```

```
MST00
```

```
MST00 is executing the mstp compatible Multiple Spanning Tree
Protocol
```

```

Bridge Id      Priority 32768
Address        00:51:02:03:04:05
Max age is 20 sec, forward delay is 15 sec
Name      Role      State      Cost      Prio      Type
----      -
Gi0/1     Designated Forwarding 200000    128      SharedLan

```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface / VLAN interface / port-channel interface / tunnel interface / OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning

tree statistics information.

- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.27 show spanning-tree interface

This command displays the port related spanning tree information for the specified interface.

The information contains port ID, port role, port state, port cost, port priority and link type. The generic command cannot be executed without any option in the PVRST mode.

If switch PVRST_WANTED is set as no during compilation of exe:

```
show spanning-tree interface <interface-type> <interface-id> [{ cost |
priority | portfast | rootcost | restricted-role | restricted-tcn | state |
stats | detail }]
```

If switch PVRST_WANTED is set as yes during compilation of exe:

```
show spanning-tree interface <interface-type> <interface-id> [{ bpduguard |
cost | encapsulationtype | priority | portfast | rootcost | rootguard |
restricted-role | restricted-tcn | state | stats | detail }]
```

Syntax Description n	<interface-type>	<ul style="list-style-type: none"> - Displays the port related spanning tree information for the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. • port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.
	<interface-id>	<ul style="list-style-type: none"> - Displays the port related spanning tree information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan and port-channel ID is provided, for interface

	types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
bpduguard	- Displays the status of the BPDU guard feature for the interface.
cost	- Displays the cost of the port or instances assigned to that port. This option cannot be executed in the PVRST mode.
encapsulationtype	- Displays the encapsulation type used in the interface.
priority	- Displays the priority of the port or instances assigned to that port. This option cannot be executed in the PVRST mode.
portfast	- Displays the status of the portfast feature for the port or instances assigned to that port.
rootcost	- Displays the root cost of the port or instances assigned to that port. The root cost defines the pathcost to reach the root bridge. This option cannot be executed in the PVRST mode.
rootguard	- Displays the status of the root guard feature for the interface.
restricted-role	- Displays the status of the restricted role feature for the port. This option cannot be executed in the PVRST mode.
restricted-tcn	- Displays the status of the restricted TCN feature for the port. This option cannot be executed in the PVRST mode.
state	- Displays the state of the port. This option cannot be executed in the PVRST mode.
stats	- Displays the port level spanning tree statistics information. This option cannot be executed in the PVRST mode.
detail	- Displays detailed spanning tree related information for the port. The information contains current selected spanning

mode, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, bridge and port level spanning tree statistics information, link-type, and status of L2GP, loop guard, BPDU receive, BPDU transmit, restricted TCN, restricted role and portfast features.

This option cannot be executed in the PVRST mode.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example **Single Instance**

```
iss# show spanning-tree interface gigabitethernet 0/1
```

Instance	Role	State	Cost	Prio	Type
MST00	Root	Forwarding	200000	128.1	SharedLan

```
iss# show spanning-tree interface gigabitethernet 0/1 cost
Port cost is 200000
```

```
iss# show spanning-tree interface gigabitethernet 0/1 priority
Port Priority is 128
```

```
iss# show spanning-tree interface gigabitethernet 0/1 portfast
PortFast is disabled
```

```
iss# show spanning-tree interface gigabitethernet 0/1 rootcost
Root Cost is 200000
```

```
iss# show spanning-tree interface gigabitethernet 0/1 state
Forwarding
```

```
iss# show spanning-tree interface gigabitethernet 0/1 stats
```

```
Statistics for Port Gi0/1
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received       : 1692
Number of Config BPDU Count received      : 9
Number of TCN BPDU Count received         : 0
Number of RSTP BPDU Count Transmitted     : 735
Number of Config BPDU Count Transmitted   : 11
Number of TCN BPDU Count Transmitted      : 0
Number of Invalid BPDU Count Transmitted  : 0
Port Protocol Migration Count             : 1
```

```
iss# show spanning-tree interface gigabitethernet 0/1 detail
```

```

Port 1 [Gi0/1] is Designated, Forwarding
Port PathCost 200000, Port Priority 128, Port Identifier 128.1
Designated Root has priority 32768, address 00:01:02:03:04:01
Designated Bridge has priority 32768, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
No of Transitions to forwarding State :2
PortFast is enabled
Link Type is Shared
BPDUs : sent 1780 , recieved 254
Timers: Hello - 0, Forward Delay - 0, Topology Change - 0
Restricted Role is disabled.
Restricted TCN is disabled.
bpdu-transmit enabled
bpdu-receive enabled

```

```
iss# show spanning-tree interface fast 0/1 restricted-role
```

```
Restricted Role is Disabled
```

```
iss# show spanning-tree interface fast 0/1 restricted-tcn
```

```
Restricted TCN is Disabled
```

Multiple Instance:

```
iss# show spanning-tree interface gigabitethernet 0/1
```

```
Switch - default
```

Role	State	Cost	Prio	Type
Root	Forwarding	200000	128	SharedLan

```
iss# show spanning-tree interface gigabitethernet 0/1 cost
Port cost is 200000
```

```
Switch - default
```

```
iss# show spanning-tree interface gigabitethernet 0/1 priority
```

```
Switch - default
```

```
Port Priority is 128
```

```
iss# show spanning-tree interface gigabitethernet 0/1 portfast
```

```
Switch - default
```

```
PortFast is disabled
```

```
iss# show spanning-tree interface gigabitethernet 0/1 rootcost
```

```
Switch - default
```

```
Root Cost is 200000
```

```
iss# show spanning-tree interface gigabitethernet 0/1 state
```

```
Switch - default
```

```
Forwarding
```

```
iss# show spanning-tree interface gigabitethernet 0/1 stats
```

```
Switch - default
```

```
Statistics for Port Gi0/1
```

```
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received       : 1692
Number of Config BPDU Count received     : 9
Number of TCN BPDU Count received        : 0
Number of RSTP BPDU Count Transmitted    : 735
Number of Config BPDU Count Transmitted  : 11
Number of TCN BPDU Count Transmitted     : 0
Number of Invalid BPDU Count Transmitted : 0
Port Protocol Migration Count            : 1
```

```
iss# show spanning-tree interface gigabitethernet 0/1 detail
```

```
Switch - default
```

```
Port 1 [Gi0/1] is Root      , Forwarding
Port PathCost 200000, Port Priority 128, Port Identifier 128.1
Designated Root has priority 8192, address 00:01:02:03:04:21
Designated Bridge has priority 8192, address 00:01:02:03:04:21
Designated Port Id is 128.1, Designated PathCost 0
No of Transitions to forwarding State :1
PortFast is disabled
Link Type is Shared
BPDUs : sent 735 , recieved 1729
```

```
iss# show spanning-tree interface fast 0/1 restricted-role
```

```
Switch - default
```

```
Restricted Role is Disabled
```

```
iss# show spanning-tree interface fast 0/1 restricted-tcn
```

```
Switch - default
```

```
Restricted TCN is Disabled
```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.

- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree restricted-role** - Enables the restricted role feature for a port.
- **spanning-tree restricted-tcn** - Enables the topology change guard / restricted TCN feature on a port.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree bpdu-receive** - Configures the processing status of the BPDUs received in a port.
- **spanning-tree bpdu-transmit** - Configures the BPDU transmission status of a port.
- **spanning-tree loop-guard** - Enables the loop guard feature in a port.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **clear spanning-tree detected protocols** - Restarts the protocol migration process on all interfaces in the switch and forces renegotiation with the neighboring switches.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **spanning-tree bpduguard** - Configures the status of BPDU guard feature in an interface.
- **spanning-tree guard** - Configures the various PVRST guard features such as root guard, in a port.
- **spanning-tree encap** - Configures the encapsulation type to be used in an interface.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.28 show spanning-tree root

This command displays the spanning tree root information. The information contain root ID, root path cost, maximum age time, forward delay time and root port, for the RSTP. The information also contains the instance ID for MSTP.

```
show spanning-tree root [{ address | cost | forward-time | id | max-age | port
| priority | detail }] [ switch <context_name>]
```

Syntax Description	address	- Displays the MAC address of the root bridge.
	cost	- Displays the cost of the root bridge.
	forward-time	- Displays the forward delay time of the root bridge.
	id	- Displays the ID of the root bridge.
	max-age	- Displays the maximum age time of the root bridge.
	port	- Displays the ID of the root port.
	priority	- Displays the priority of the root bridge.
	detail	- Displays the root priority, root address, root cost, root port, forward delay time and maximum age time.
	switch	- Displays spanning tree root information, for the specified context. This value represents unique name of the switch context. This value is a string whose maximum size is 32. This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example **Single Instance:**
 iss# show spanning-tree root

```
Root ID          RootCost MaxAge FwdDly RootPort
-----
80:00:00:01:02:03:04:11  0       20    15     0
```



```
iss# show spanning-tree root address
```

```
Root Bridge Address is 00:01:02:03:04:11
```

```
iss# show spanning-tree root cost
```

```
Root Cost is 0
```

```
iss# show spanning-tree root forward-time
```

```
Forward delay is 15 sec
```

```
iss# show spanning-tree root id
```

```
Root Bridge Id is 80:00:00:01:02:03:04:11
```

```
iss# show spanning-tree root max-age
```

```
Root MaxAge is 20
```

```
iss# show spanning-tree root port
```

```
Root Port is 0
```

```
iss# show spanning-tree root priority
```

```
Root Priority is 32768
```

```
iss# show spanning-tree root detail
```

```
We are the root of the Spanning Tree
```

```
Root Id      Priority 32768
Address      00:01:02:03:04:11
Cost         0
Port         0
Hello Time 2 Sec, Max Age 20 Sec, Forward
Delay 15 Sec
```

Multiple Instance:

```
iss# show spanning-tree root
```

```
Switch - default
```

Instance	Root ID	RootCost	MaxAge	FwdDly	RootPort
MST00	80:00:00:01:02:03:04:01	0	20	15	0

```
Switch - cust1
```

```

Instance  Root ID          RootCost MaxAge FwdDly RootPort
-----  -
MST00  00:00:00:01:02:03:04:04  200000  20   15   Gi0/2

```



- This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This configuration is not supported in PVRST mode.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.29 show spanning-tree bridge

This command displays the spanning tree bridge information. The information contain bridge ID, hello time, maximum age time, forward delay time and protocol enabled, for the RSTP. The information also contains the instance ID for MSTP.

```
show spanning-tree bridge [{ address | forward-time | hello-time | id | max-
age | protocol | priority | detail }] [ switch <context_name>]
```

Syntax Description	address	- Displays the MAC address of the bridge.
	forward-time	- Displays the forward delay time of the bridge.
	hello-time	- Displays the hello time of the bridge.
	id	- Displays the ID of the bridge.
	max-age	- Displays the maximum age time of the bridge.
	protocol	- Displays the protocol currently enabled in the bridge.
	priority	- Displays the priority of the bridge.
	detail	- Displays the priority, address, maximum age time and forward delay time for the bridge.
	switch	- Displays spanning tree bridge information, for the specified context. This value represents unique name of the switch context. This value is a string whose maximum size is 32. This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree bridge address
```

```
Bridge Address is 00:01:02:03:04:21
```

```
iss# show spanning-tree bridge forward-time
```

```
Bridge Forward delay is 15 sec
```

```
iss# show spanning-tree bridge
```

```
Bridge ID          HelloTime MaxAge FwdDly Protocol
-----
80:00:00:01:02:03:04:21    2      20    15    rstp
```

```
iss# show spanning-tree bridge hello-time
```

```
Bridge Hello Time is 2 sec
```

```
iss# show spanning-tree bridge id
```

```
Bridge ID is 80:00:00:01:02:03:04:21
```

```
iss# show spanning-tree bridge max-age
```

```
Bridge Max Age is 20 sec
```

```
iss# show spanning-tree bridge protocol
```

```
Bridge Protocol Running is RSTP
```

```
iss# show spanning-tree bridge priority
```

```
Bridge Priority is 32768
```

```
iss# show spanning-tree bridge detail
```

```
Bridge Id          Priority 32768,
                   Address 00:01:02:03:04:21
                   Hello Time 2 sec, Max Age 20 sec, Forward
                   Delay 15 sec
```

Multiple Instance:

```
iss# show spanning-tree bridge
```

```
Switch - default
```

```
MST Instance Bridge ID          MaxAge FwdDly Protocol
-----
MST00      0 :00:00:01:02:03:04:01    20    15    mstp
```

```
Switch - cust1
```

```
MST Instance Bridge ID          MaxAge FwdDly Protocol
-----
MST00      0 :00:00:01:02:03:04:02    20    15    mstp
```

```
iss# show spanning-tree bridge address
```

```
Switch - default
```

```
MST00      00:01:02:03:04:01
```

```
Switch - cust1
```

```
MST00      00:01:02:03:04:0
```



- This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.
- This configuration is not supported in PVRST mode.

**Related
Commands**

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.30 show spanning-tree – layer 2 gateway port

This command displays spanning tree information for all L2GPs enabled in the switch. The information contains pseudoroot priority, pseudo root MAC address and state of the L2GP.

```
show spanning-tree [interface <interface-type> <interface-id>] layer2-gateway-
port [switch <context_name>]
```

Syntax Description	<interface-type>	<ul style="list-style-type: none"> - Displays L2GP related spanning tree information for the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. • port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.
	<interface-id>	<ul style="list-style-type: none"> - Displays L2GP related spanning tree information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan and port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
	switch	<ul style="list-style-type: none"> - Displays L2GP related spanning tree information, for the specified context. This value represents unique name of the switch context. This value is a string whose maximum size is 32. This parameter is specific to multiple instance feature.
Mode	Privileged EXEC Mode	

Package Workgroup, Enterprise and Metro

Example iss# show spanning-tree interface gigabitethernet 0/1 layer2-gateway-port switch default

Switch default

Port Gi0/1

		PseudoRootId	
Instance	Priority	MacAddress	State
MST00	4096	00:00:11:22:33:44	Forwarding
MST01	8192	00:00:12:34:45:55	Forwarding
MST02	4096	00:00:12:34:45:5a	Forwarding



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set, if the functionality is already shutdown.

Related Commands

- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface / VLAN interface / port-channel interface / tunnel interface / OOB interface.
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.1.31 show customer spanning-tree

This command displays the detailed customer spanning tree information.

```
show customer spanning-tree [cep interface <interface-type> <interface-
number>] [{ detail [active] | active [detail] }]
```

Syntax Description	cep interface	- Customer Edge Port
	detail	- Displays in detail about the port and bridge. This includes designated Bridge details, designated port details, timer values, root bridge and so on.
	active	- Displays the Bridge and details of the active (active ports are those ports that are participating in the spanning-tree) ports

Mode Privileged EXEC Mode

Package Metro

Example Single Instance:
 iss# show customer spanning-tree cep interface fast 0/1

```
Port [Gi0/1]
We are the root of the Spanning Tree
Root Id      Priority    65535
Address      00:01:02:03:04:01
Cost         0
Root Ports
Hello Time 2 Sec, Max Age 0 Sec, Forward Delay 0
Sec

Customer Spanning Tree Enabled Protocol RSTP
Bridge Id     Priority 65535
Address 00:01:02:03:04:01
Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec

Name          Role          State          Cost          Prio    Type
----          -
PEP-Service: 2 Designated Forwarding     128          32    SharedLan
CEP-Gi0/1     Designated Forwarding     200000       32    SharedLan

iss# show customer spanning-tree

Port [Gi0/1]
We are the root of the Spanning Tree
Root Id      Priority    65535
Address      00:01:02:03:04:01
```



```

Cost          0
Root Ports
Hello Time 2 Sec, Max Age 0 Sec, Forward Delay 0
Sec

Customer Spanning Tree Enabled Protocol RSTP
Bridge Id      Priority 65535
Address 00:01:02:03:04:01
Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
Name           Role           State           Cost           Prio    Type
-----
PEP-Service: 2 Designated   Forwarding     128            32      SharedLan
CEP-Gi0/1      Designated   Forwarding     200000         32      SharedLan

```

Multiple Instance:

```
iss# show customer spanning-tree
```

```
Switch default
```

```
Port [Gi0/1]
```

```
We are the root of the Spanning Tree
```

```

Root Id      Priority 65535
Address      00:01:02:03:04:01
Cost         0
Root Ports
Hello Time 2 Sec, Max Age 0 Sec, Forward Delay 0
Sec

```

```
Customer Spanning Tree Enabled Protocol RSTP
```

```

Bridge Id      Priority 65535
Address 00:01:02:03:04:01
Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
Name           Role           State           Cost           Prio    Type
-----
PEP-Service: 2 Designated   Forwarding     128            32      SharedLan
CEP-Gi0/1      Designated   Forwarding     200000         32      SharedLan

```

```
iss# show customer spanning-tree cep interface fastethernet 0/1
```

```
Switch default
```

```
Port [Gi0/1]
```

```
We are the root of the Spanning Tree
```

```

Root Id      Priority 65535
Address      00:01:02:03:04:01
Cost         0
Root Ports
Hello Time 2 Sec, Max Age 0 Sec, Forward Delay 0
Sec

```

```
Customer Spanning Tree Enabled Protocol RSTP
```

```
Bridge Id      Priority 65535
```

```
Address 00:01:02:03:04:01
Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
Name          Role      State      Cost      Prio      Type
-----
PEP-Service: 2 Designated Forwarding 128       32       SharedLan
CEP-Gi0/1     Designated Forwarding 200000    32       SharedLan
```



The port must be configured as CEP.

**Related
Command**

show customer spanning-tree – Displays the detailed customer spanning information

18.2 MSTP

This section describes all MSTP related commands. These commands are available only if the switch MSTP_WANTED is set as yes during compilation of exe.

18.2.1 spanning-tree mst max-hops

This command configures the maximum number of hops permitted in the MSTP.

The no form of this command resets the maximum number of hops to its default value.

The number of hops represents the maximum number of switches that a packet can cross before it is dropped. The switch uses this value to avoid infinite looping of the packets, if it is elected as the root switch in the topology.

The root switch always transmits a BPDU with the maximum hop count value. The receiving switch decrements the value by one and propagates the BPDU with modified hop count value. The BPDU is discarded and the information held is aged out, when the count reaches 0.

This value ranges between 6 and 40.

spanning-tree mst max-hops <value(6-40)>

no spanning-tree mst max-hops

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 20

Example `iss(config)#spanning-tree mst max-hops 10`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree mst - CIST or specified mst Instance --** Displays multiple spanning tree information for all MSTIs in the switch.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

18.2.2 spanning-tree mst configuration

This command enters into MSTP configuration mode, where instance specific and MST region configuration can be done.

spanning-tree mst configuration

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)#spanning-tree mst configuration`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

- Related Command**
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
 - **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.

18.2.3 spanning-tree mst max-instance

This command configures the maximum number of active MSTIs that can be created.

The no form of this command resets maximum MSTP instance value to its default value.

This configuration allows you to limit the number of spanning tree instances to be allowed in the switch. This does not count the special MSTID such as PTETID, used to identify the VIDs which is used by ESPs.

This value ranges between 1 and 64.

```
spanning-tree mst max-instance <short (1-64)>
```

```
no spanning-tree mst max-instance
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 64

Example `iss(config)# spanning-tree mst max-instance 40`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **instance** - Creates an MST instance and maps it to VLANs.

18.2.4 spanning-tree mst root

This command enables BPDU (Bridge Protocol Data Unit) transmission and reception on the interface and the no form of the command disables BPDU transmission and reception on the interface.

This command is a standardized implementation of the existing command; **spanning-tree priority**. It operates similar to the existing command.

```
spanning-tree mst {instance-id <instance-id(1-64)>} root {primary | secondary}
```

```
no spanning-tree mst {instance-id <instance-id(1-64)>} root
```

Syntax Description	instance-id	- Instance identification number. This values ranges between 1 and 64.
	primary	- Sets high enough priority (low value) for the switch so that the switch can be made as the bridge root of the spanning-tree instance. The priority value will be set as 24576.
	secondary	- Sets the switch as a secondary root, if the primary root fails. The priority value will be set as 28672.
	Mode	Global Configuration Mode
Package	Workgroup, Enterprise and Metro	
Example	iss(config)# spanning-tree mst instance-id 1 root secondary	
Related Commands	• show spanning-tree detail - Displays detailed spanning tree information	
	• show spanning-tree active - Displays spanning tree information of active ports	

18.2.5 spanning-tree mst forward-time

This command³ configures the forward timer of the spanning tree and the no form of the command sets the forward timer to the default value. The forward timer controls the speed at which a port changes its spanning tree state from Blocking state to Forwarding state. The timer value ranges between 4 and 30 seconds.

This command is a standardized implementation of the existing command; **spanning-tree timers**. It operates similar to the existing command.

spanning-tree mst forward-time <seconds (4-30)>

no spanning-tree mst forward-time

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults forward-time - 15 secs

Example iss(config)# spanning-tree mst forward-time 4



The following relation must be observed while configuring the timers:

- $2 * (\text{Forward-time} - 1) \geq \text{Max-age}$

**Related
Commands**

- **show spanning-tree bridge** - Displays spanning tree configuration of the bridge forward time
- **show spanning-tree detail** - Displays detailed spanning tree information
- **show spanning-tree active** - Displays spanning tree information of active ports

³ This command is currently not supported.

18.2.6 spanning-tree mst max-age

This command³ configures the max-age timer of the spanning tree and the no form of the command sets the max-age timer to the default value. The max-age timer denotes the time (in seconds) after which the spanning tree protocol information learnt from the network on any port will be discarded. The timer value ranges between 6 and 40 seconds.

This command is a standardized implementation of the existing command; **spanning-tree timers**. It operates similar to the existing command.

spanning-tree mst max-age <seconds (6-40)>

no spanning-tree mst max-age

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults max-age - 20 secs

Example iss(config)# spanning-tree mst max-age 7



The following relation must be observed while configuring the timers:

- $2 * (\text{Forward-time} - 1) \geq \text{Max-age}$
- $\text{Max-Age} \geq 2 * (\text{Hello-time} + 1)$

Related Commands

- **show spanning-tree bridge** - Displays spanning tree configuration of the bridge forward time
- **show spanning-tree detail** - Displays detailed spanning tree information
- **show spanning-tree active** - Displays spanning tree information of active ports

18.2.7 name

This command configures the name for the MST region.

The no form of this command resets the name to its default value.

The name is unique and used to identify the specific MST region. Each MST region contains multiple spanning tree instances and runs special instance of spanning tree known as IST to disseminate STP topology information for other STP instances.

name <string(optional max Length)>

no name

Mode MSTP Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Same as that of the base MAC address of the switch.

Example `iss(config-mst)#name regionone`

Related Command

- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.
- **show spanning-tree mst configuration** - Displays multiple spanning tree instance related information.

18.2.8 revision

This command configures the revision number for the MST region. This value ranges between 0 and 65535.

The no form of this command resets the revision number to its default value.

revision <value (0–65535)>

no revision

Mode MSTP Configuration mode

Package Workgroup, Enterprise and Metro

Defaults 0

Example `iss(config-mst)#revision 100`

Related Command

- **show spanning-tree mst configuration** - Displays multiple spanning tree instance related information.

18.2.9 instance

This command creates an MST instance and maps it to VLANs.

The no form of this command deletes the instance / unmaps specific VLANs from the MST instance.

```
instance <instance-id(1-64|4094)> vlan <vlan-range>
```

```
no instance <instance-id (1-64)> [vlan <vlan-range>]
```

Syntax Description	<instance-id(1-64 4094)>	- Configures the ID of MSTP instance to be created / deleted and mapped with / unmapped from VLAN. This value ranges between 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs.
	vlan	- Configures a VLAN ID or list of VLAN IDs that should be mapped with / unmapped from the specified MST instance. This value is a string whose maximum size is 9. For example, the value is provided as 4000-4010 to represent the list of VLANs IDs from 4000 to 4010.
Mode	MSTP configuration Mode	
Package	Workgroup, Enterprise and Metro	
Defaults	Instance 0 is created and mapped with all VLANs (1-4094).	
Example	<pre>iss(config-mst)#instance 2 vlan 2</pre>	
Related Command	<ul style="list-style-type: none"> • spanning-tree priority - Configures the priority value that is assigned to the switch. • spanning-tree - Pseudoroot configuration - Configures the pseudoroot related information for a port set as L2GP. • spanning-tree mst max-instance - Configures the maximum number of active MSTIs that can be created. • spanning-tree mst- Properties of an interface for MSTP - Configures the port related spanning tree information for a specified MSTI. • show spanning-tree mst - CIST or specified mst Instance - Displays multiple spanning tree information for all MSTIs in the switch. • show spanning-tree mst configuration - Displays multiple spanning tree instance related information. 	

- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

18.2.10 spanning-tree mst- Properties of an interface for MSTP

This command configures the port related spanning tree information for a specified MSTI in a port.

The no form of this command resets the spanning tree information of a port to its default value.

```
spanning-tree mst <instance-id(1-64)> { cost <value(1-200000000)> | port-  
priority <value(0-240)> | disable }
```

```
no spanning-tree mst <instance-id(1-64)>{cost|port-priority | disable}
```

Syntax Description	<instance-id(1-64)>	- Configures the ID of MSTP instance already created in the switch. This value ranges between 1 to 64.
	cost	- Configures the port's path cost value that contributes to the path cost of paths containing this particular port. The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port. This value ranges between 1 and 200000000. The configured path cost is used, even if the dynamic pathcost calculation feature or LAGG speed feature is enabled.
	port-priority	- Configures the priority value assigned to the port. This value is used during port role selection process. This value ranges between 0 and 240. This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48, and so on. The MSTP puts the interface with lowest number in forwarding state and blocks all other interfaces, if all interfaces have the same priority value.
	disable	- Disables the spanning tree operation on the port. The port does not take part in the execution of spanning tree operation for preventing undesirable loops in the network.

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults	cost	- 200000 for all physical ports 199999 for port channels
	port-priority	- 128
	disable	- Spanning tree operation is enabled in the port.

Example

```
iss(config-if)#spanning-tree mst 2 cost 4000
iss(config-if)#spanning-tree mst 1 port-priority 32
iss(config-if)#spanning-tree mst 2 disable
```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **instance** - Creates an MST instance and maps it to VLANs.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree mst - CIST or specified mst Instance** - Displays multiple spanning tree information for all MSTIs in the switch.

18.2.11 spanning-tree mst hello-time

This command configures the hello time for an interface.

The no form of this command resets the hello time to its default value.

The hello time represents the time interval (in seconds) between two successive configuration BPDUs generated by the switch on the port. This value is either 1 or 2 seconds. This value is applied to all active MSTIs on the interface.

spanning-tree mst hello-time<value(1-2)>

no spanning-tree mst hello-time

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults 2 seconds

Example `iss(config-if)#spanning-tree mst hello-time 1`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **show spanning-tree root** - Displays the spanning tree root information.
- **show spanning-tree bridge** - Displays the spanning tree bridge information.
- **show spanning-tree mst - Port Specific Configuration** - Displays multiple spanning tree port specific information for the specified port.

18.2.12 show spanning-tree mst - CIST or specified mst Instance

This command displays multiple spanning tree information for all MSTIs in the switch.

The information contain MSTI ID, VLAN IDs mapped to the instance, bridge address and priority, root address and priority, IST root address, priority and path cost, forward delay, maximum age, maximum hop count, and port details of interfaces enabled in the switch. The port details contain interface ID, port role, port state, port cost, port priority and port link type.

```
show spanning-tree mst [<instance-id(1-64|4094)>] [detail] [ switch
<context_name>]
```

Syntax Description	instance-id	<ul style="list-style-type: none"> - Displays the multiple spanning tree information for the specified MSTI. <p>This value ranges between 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs.</p>
	detail	<ul style="list-style-type: none"> - Displays the detailed multiple spanning tree information for the MSTI. <p>This information contain MSTI ID, VLAN IDs mapped to the instance, bridge address and priority, root address and priority, IST root address, priority and path cost, forward delay, maximum age, maximum hop count, and BPDUs sent and received in the port.</p>
	switch	<ul style="list-style-type: none"> - Displays multiple spanning tree bridge information, for the specified context. <p>This value represents unique name of the switch context.</p> <p>This value is a string whose maximum size is 32.</p> <p>This parameter is specific to multiple instance feature.</p>

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree mst 1
```

```
## MST01
Vlans mapped: 2
Bridge Address 00:01:02:03:04:11 Priority 32768
Root Address 00:01:02:03:04:11 Priority 32768
Root this switch for MST01
```

```
Interface Role Sts Cost Prio.Nbr Type
```



```

-----
Gi0/1  Master    Forwarding    200000    128.1    SharedLan

iss# show spanning-tree mst 1 detail

## MST01
Vlans mapped:    2
Bridge          Address 00:01:02:03:04:11    Priority 32768
Root            Address 00:01:02:03:04:11    Priority 32768
Root            this switch for MST01

Gi0/1 of MST01 is Master    , Forwarding
Port info   port id 128.1    priority 128    cost 200000
Designated root   address 00:01:02:03:04:11    priority 32768
cost 0
Designated bridge address 00:01:02:03:04:11    priority 32768
port id 128.1

```

Multiple Instance:

```

iss# show spanning-tree mst 1

Switch - default

## MST01
Vlans mapped:    2
Bridge          Address 00:01:02:03:04:11    Priority 32768
Root            Address 00:01:02:03:04:11    Priority 32768
Root            this switch for MST01

Interface Role      Sts      Cost      Prio.Nbr  Type
-----
Gi0/1  Master    Forwarding    200000    128.1    SharedLan

```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.

- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **instance** - Creates an MST instance and maps it to VLANs.
- **spanning-tree mst- Properties of an interface for MSTP** - Configures the port related spanning tree information for a specified MSTI.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.
- **shutdown - physical/VLAN/port-channel/tunnel Interface** - Disables a physical interface / VLAN interface / port-channel interface / tunnel interface / OOB interface.

18.2.13 show spanning-tree mst configuration

This command displays multiple spanning tree instance related information. This information contains the MST region name, MST region revision, and a list containing MSTI IDs and VLAN IDs mapped to the corresponding MSTI.

show spanning-tree mst configuration [switch <context_name>]

Syntax	switch	-	Displays multiple spanning tree instance related information, for the specified context.
Description			This value represents unique name of the switch context.
n			This value is a string whose maximum size is 32.
			This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree mst configuration
```

```

Name           [00:02:02:03:04:01]
Revision       0
Instance       Vlans mapped
-----
0              1, 3-1024, 1025-2048, 2049-3072,
              3073-4094
1              2
-----

```

Multiple Instance:

```
iss# show spanning-tree mst configuration
```

```
Switch - default
```

```

Name           [00:01:02:03:04:01]
Revision       0
Instance       Vlans mapped
-----
0              1-1024, 1025-2048, 2049-3072, 3073-4094
-----

```

```
Switch - cust1
```

```

Name           [00:01:02:03:04:02]
Revision       0
Instance       Vlans mapped

```

```
-----  
0                               1-1024,1025-2048,2049-3072,3073-4094  
-----
```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **name** - Configures the name for the MST region.
- **revision** - Configures the revision number for the MST region.
- **instance** - Creates an MST instance and maps it to VLANs.

18.2.14 show spanning-tree mst - Port Specific Configuration

This command displays multiple spanning tree port specific information for the specified port. This information contains interface ID, edge port status, port link type, port hello time, BPDUs sent and received on the port, and instance related details. The instance details contain MSTI ID, MSTI role, MSTI status, MSTI cost and MSTI priority.

```
show spanning-tree mst [<instance-id(1-64|4094)>] interface <interface-type>
<interface-id> [{ stats | hello-time | detail }]
```

Syntax **instance-id**
Description
n

- Displays the multiple spanning tree port specific information for the specified MSTI.

This value ranges between 1 to 64. The special value 4094 can be used only in the switch that supports PBB-TE. This special value represents PTETID that identifies VID used by ESPs.

<interface-type>

- Displays the multiple spanning tree port specific information for the specified type of interface. The interface can be:
 - fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
 - gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second.
 - extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
 - internal-lan – Internal LAN created on a bridge per IEEE 802.1ap.
 - port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.

<interface-id>

- Displays the multiple spanning tree port specific information for the specified interface identifier. This is a unique value that represents the specific interface.
This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.
For example: 0/1 represents that the slot number is 0 and port number is 1.
Only i-lan and port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.

- | | |
|-------------------|--|
| stats | - Displays the number of BPDUs sent and received for the MSTIs assigned to the specified interface. |
| hello-time | - Displays the hello time of the MSTIs assigned to the specified interface. |
| detail | - Displays detailed multiple spanning tree port specific information for the specified interface.
The information contain port priority, port cost, root address, priority and cost, IST address, priority and cost, bridge address, priority and cost, forward delay, maximum age, maximum hop count, and BPDUs sent and received. |

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example iss# show spanning-tree mst 1 interface gigabitethernet 0/1

```

Instance  Role      Sts      Cost      Prio.Nbr
-----  -
1         Master    Forwarding  200000    128.1

```

```

iss# show spanning-tree mst 1 interface gigabitethernet 0/1
stats

```

```

MST01      Bpdus sent 2, Received 0

```

```

iss# show spanning-tree mst 1 interface gigabitethernet 0/1
hello-time

```

```

MST01      2

```

```

iss# show spanning-tree mst 1 interface gigabitethernet 0/1
detail

```

```

Gi0/1 of MST01 is Master      , Forwarding
Port info          port id 128.1          priority 128    cost
200000
Designated root    address 00:01:02:03:04:11    priority 32768
cost 0
Designated bridge  address 00:01:02:03:04:11    priority 32768
port id 128.1

```



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as mst.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.

- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree timers** - Sets the spanning tree timers such as hello time, that are used for controlling the transmission of BPDUs during the computation of loop free topology.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree priority** - Configures the priority value that is assigned to the switch.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree mst max-hops** - Configures the maximum number of hops permitted in the MST.
- **instance** - Creates an MST instance and maps it to VLANs.
- **spanning-tree mst hello-time** - Configures the hello time for an interface that is enabled.

18.3 PVRST+

This section describes all PVRST+ protocol related commands. These commands are available only if the switch PVRST_WANTED is set as yes during compilation of exe.

18.3.1 spanning-tree vlan

This command configures spanning tree related information on a per VLAN basis.

The no form of this command resets the spanning tree related information to its default values.

```
spanning-tree vlan <vlan-id(1-4094)> {forward-time <seconds(4-30)> | hello-
time <seconds(1-10)> | max-age <seconds(6-40)> | hold-count <integer(1-10)> |
brg-priority <integer(0-61440)> | root {primary | secondary}}
```

```
no spanning-tree vlan <vlan-id(1-4094)> {forward-time | hello-time | max-age |
hold-count | brg-priority | root}
```

Syntax Description	vlan-id	<ul style="list-style-type: none"> - Configures the spanning tree related information for the specified VLAN ID. <p>This is a unique value that represents the specific VLAN created.</p> <p>This value ranges between 1 and 4094.</p>
	forward-time	<ul style="list-style-type: none"> - Configures the number of seconds, a port waits before changing from the listening and learning states to the forwarding state. <p>This value ranges between 4 and 30 seconds.</p>
	hello-time	<ul style="list-style-type: none"> - Configures the time interval (in seconds) between two successive configuration BPDUs generated by the root switch. <p>This value ranges between 1 and 10 seconds.</p>
	max-age	<ul style="list-style-type: none"> - Configures the maximum expected arrival time (in seconds) of hello BPDUs. STP information learned from network on any port is discarded, once the configured arrival time expires. <p>The spanning tree topology is re-computed after this time interval.</p> <p>This value ranges between 6 and 40 seconds.</p>
	hold-count	<ul style="list-style-type: none"> - Configures the maximum number of packets that can be sent in a given hello time interval.

This value is used to limit the maximum transmission rate of the switch and to avoid flooding.

This value ranges between 1 and 10.

brg-priority

Configures the bridge priority to be assigned for the specified VLAN.

This value ranges between 0 and 61440. The value should be set in steps of 4096, that is, you can set the value as 0, 4096, 8192, 12288 and so on.

root primary

- Configures the switch to become root for a given VLAN. The priority of the switch is lowered until it becomes root.

secondary

- Configures the switch to become backup root for a given VLAN.

The priority of the switch is lowered until it becomes one priority higher than the root, so it can become root if the current root fails.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

forward-delay	-	15 seconds
hello-time	-	2 seconds
max-age	-	20 seconds
hold-count	-	3
brg-priority	-	32768 + VLAN ID

Example `iss(config)# spanning-tree vlan 2 forward-time 18`



1. This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.
2. The configuration can be done only for the VLANs that are activated in the switch.
3. The values configured for the spanning tree timers should satisfy the following conditions:
 - $2 * (\text{forward-time} - 1) \geq \text{max-age}$, and
 - $\text{max-age} \geq 2 * (\text{hello-time} + 1)$

**Related
Commands**

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost**, redundancy - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - bridge** - Displays the PVRT related information of the bridge for the specified VLAN ID.
- **show spanning-tree vlan - root** - Displays the PVRT related information of the root, for the specified VLAN ID.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.

18.3.2 spanning-tree bpduguard

This command configures the status of BPDU guard feature in an interface.

The no form of this command disables the BPDU guard feature.

The BPDU guard feature disables the port and puts the port in error-disabled state on receiving BPDU, if the portfast feature is enabled on the port. This feature prevents the devices connected to the port from participating in STP operation. Once disabled, the port can be enabled only manually.

```
spanning-tree bpduguard {disable | enable}
```

```
no spanning-tree bpduguard
```

Syntax Description	disable	- Disables BPDU guard feature in the interface.
	enable	- Enables BPDU guard feature in the interface.

Mode Interface Configuration mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults BPDU guard feature is disabled.

Example `iss(config-if)# spanning-tree bpduguard enable`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.

- Related Commands**
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
 - **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
 - **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.

18.3.3 spanning-tree guard

This command configures the various PVRST guard features such as root guard, in a port.

The no form of this command resets the guard feature to its default value.

```
spanning-tree guard {root | none | loop}
```

```
no spanning-tree guard
```

Syntax Description	root	<ul style="list-style-type: none"> - Enables root guard feature in the port. <p>This feature prevents the port from becoming root port or blocked port. The port changes to the root-inconsistent state, if the port receives superior BPDUs. The port automatically reverts back to forwarding state, once the superior BPDUs are not received.</p>
	none	<ul style="list-style-type: none"> - Disables both root and loop guard features in the port.
	loop	<ul style="list-style-type: none"> - Enables loop guard feature in the port. <p>This feature changes the port to an inconsistent state if no BPDUs are received. Thus isolating the failure and letting spanning tree converge to a stable topology until the port starts receiving BPDUs again. This feature is currently not supported.</p>

Mode Interface Configuration mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults None (No PVRST guard feature is enabled).

Example `iss(config-if)# spanning-tree guard root`



- This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.
- The guard feature can be configured only on ports that are set as trunk port.

- Related Commands**
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
 - **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
 - **show spanning-tree interface** - Displays the port related spanning tree

information for the specified interface.

- **switchport mode trunk** – Configures the port as trunk port.

18.3.4 spanning-tree encap

This command configures the encapsulation type to be used in an interface.

The no form of this command resets the encapsulation type to its default value.

The encapsulation defines the VLAN services available and identifies / tags frames transmitted between switches.

```
spanning-tree encap {dot1q | ISL}
```

```
no spanning-tree encap
```

Syntax Description	dot1q	<ul style="list-style-type: none"> - Configures the encapsulation type as dot1Q. <p>The port sends BPDUs for the native VLAN as normal IEEE RSTP BPDUs.</p> <p>The port sends BPDUs for other VLANs with proprietary tunneled address. The PVRST unaware bridge considers these BPDUs as data packets and forward them through VLAN.</p> <p>This option is automatically set for the port, if the port is configured as access port.</p>
	ISL	<ul style="list-style-type: none"> - Configures the encapsulation type as ISL. <p>The port sends BPDUs for all VLANs as normal RSTP BPDUs (including the IEEE Ethernet header) encapsulated within an additional proprietary ISL Ethernet header that contains the VLAN ID.</p> <p>This option can set only for the port that is configured as trunk port.</p>

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults dot1q

Example `iss(config-if)# spanning-tree encap ISL`



This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.

- Related Commands**
- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
 - **spanning-tree mode** - Sets the type of spanning tree to be executed,

enables spanning tree operation and starts spanning tree functionality in the switch.


- **show spanning-tree interface** - Displays the port related spanning tree information for the specified interface.
- **switchport mode** - Configures the mode of operation for a switch port.

18.3.5 spanning-tree vlan status

This command configures the status of PVRST on a port for the specified VLAN.

PVRST works in conjunction with VLAN to provide better control over traffic in the network. It maintains a separate spanning tree for each active VLAN in the network, thus providing load balancing through multiple instances of spanning tree, fault tolerance and rapid reconfiguration support through RSTP.

spanning-tree vlan <vlan-id(1-4094)> status {disable | enable}

Syntax Description	vlan-id	<ul style="list-style-type: none"> - Configures the status of PVRST on the port for the specified VLAN ID. This is a unique value that represents the specific VLAN created. This value ranges between 1 and 4094.
	disable	<ul style="list-style-type: none"> - Disables the PVRST operation on the port for the specified VLAN ID.
	enable	<ul style="list-style-type: none"> - Enables the PVRST operation on the port for the specified VLAN ID.
Mode	Interface Configuration mode (Physical Interface Mode)	
Package	Workgroup, Enterprise and Metro	
Defaults	status	- enable
Example	<pre>iss(config-if)# spanning-tree vlan 1 status disable</pre>	
		<ul style="list-style-type: none"> • This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst. • The configuration can be done only for the VLANs that are activated in the switch.
Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch. • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • show spanning-tree - Summary, Blockedports, Pathcost, redundancy - Displays spanning tree related information available in the switch for the current STP enabled in the switch. • show spanning-tree detail - Displays detailed spanning tree related information of the switch and all ports enabled in the switch. 	

- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.


18.3.6 spanning-tree vlan port-priority

This command configures the priority of a port for the specified VLAN.

The no form of this command resets port priority for the given VLAN to its default value.

```
spanning-tree vlan <vlan-id(1-4094)> port-priority <priority(0-240)>
```

```
no spanning-tree vlan <vlan-id(1-4094)> port-priority
```

Syntax Description	vlan-id	<ul style="list-style-type: none"> - Configures the priority of the port for the specified VLAN ID. This is a unique value that represents the specific VLAN created. This value ranges between 1 and 4094.
	port-priority	<ul style="list-style-type: none"> - Configures the priority value assigned to the port. This value is used during port role selection process. This value ranges between 0 and 240. This value should be set in steps of 16, that is, you can set the value as 0, 16, 32, 48 and so on.
Mode	Interface Configuration Mode (Physical Interface Mode)	
Package	Workgroup, Enterprise and Metro	
Default	port-priority	- 128
Example	<pre>iss(config)# spanning-tree vlan 1 port-priority 16</pre>	
	 <ul style="list-style-type: none"> • This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst. • The configuration can be done only for the VLANs that are activated in the switch. 	
Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch. • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. • show spanning-tree - Summary, Blockedports, Pathcost, redundancy - Displays spanning tree related information available in the switch for the current STP enabled in the switch. • show spanning-tree detail - Displays detailed spanning tree related 	

information of the switch and all ports enabled in the switch.

- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.


18.3.7 spanning-tree vlan cost

This command configures the cost of a port for the specified VLAN.

The no form of this command resets port cost to its default value.

```
spanning-tree vlan <vlan-id(1-4094)> cost <cost(0-200000000)>
```

```
no spanning-tree vlan <vlan-id(1-4094)> cost
```

Syntax Description	vlan-id	<ul style="list-style-type: none"> - Configures the cost of the port for the specified VLAN ID. This is a unique value that represents the specific VLAN created. This value ranges between 1 and 4094.
	cost	<ul style="list-style-type: none"> - Configures the port's path cost value that contributes to the path cost of paths containing this particular port. The paths' path cost is used during calculation of shortest path to reach the root. The path cost represents the distance between the root port and designated port. This value ranges between 1 and 200000000. The configured path cost is used, even if the dynamic pathcost calculation feature or LAGG speed feature is enabled.
Mode	Interface configuration Mode (Physical Interface Mode)	
Package	Workgroup, Enterprise and Metro	
Defaults	cost	- 200000
Example	<pre>iss(config)# spanning-tree vlan 1 cost 250</pre>	
	 <ul style="list-style-type: none"> • This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst. • The configuration can be done only for the VLANs that are activated in the switch. 	
Related Commands	<ul style="list-style-type: none"> • shutdown spanning-tree - Shuts down spanning tree functionality in the switch. • spanning-tree mode - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch. 	

- **spanning-tree pathcost dynamic** - Enables dynamic pathcost calculation feature in the switch.
- **show spanning-tree - Summary, Blockedports, Pathcost, redundancy** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree detail** - Displays detailed spanning tree related information of the switch and all ports enabled in the switch.
- **show spanning-tree active** - Displays spanning tree related information available in the switch for the current STP enabled in the switch.
- **show spanning-tree vlan - Summary, Blockedports, Pathcost** - Displays PVRST related information for the specified VLAN.
- **show spanning-tree vlan - root** - Displays the PVRT related information of the root, for the specified VLAN ID.
- **show spanning-tree vlan - interface** - Displays interface specific PVRST information for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.

18.3.8 show spanning-tree vlan - Summary, Blockedports, Pathcost

This command displays PVRST related information for the specified VLAN.

This information contain spanning tree status, spanning tree mode set, port details, root cost, root port, and priority, address, hello time, maximum age, and forward delay of the root and bridge. The port details contain interface ID, port role, port state, port cost, port priority and port link type.

```
show spanning-tree vlan <vlan-id(1-4094)> [{active [detail] | blockedports |
detail [active] | pathcost-method | summary }] [ switch <context_name>]
```

Syntax	vlan-id	- Displays the PVRST related information for the specified VLAN ID. This is a unique value that represents the specific VLAN created. This value ranges between 1 and 4094.
Description	active [detail]	- active – Displays the PVRST related information for the specified VLAN ID. Detail – Displays the detailed PVRST related information for the specified VLAN ID. The information contains current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, timer values, bridge and port level spanning tree statistics information, and transmit hold-count value.
	blockedports	- Displays the list of ports in blocked state and the total number of blocked ports, for the specified VLAN.
	detail [active]	- detail – Displays the detailed PVRST related information for the specified VLAN ID. The information contains current selected spanning mode, current spanning tree compatibility version, bridge and root priority, bridge and root addresses, port path cost, port priority, timer values, bridge and port level spanning tree statistics information, and transmit hold-count value. active - Displays the detailed PVRST related information only for the active interfaces.
	pathcost-method	- Displays the pathcost method configured for the specified VLAN.
	summary	- Displays the currently used STP, applied path cost method and port details such as port ID, port role,

port state and port status

switch

- Displays the PVRST related information, for the specified context.
This value represents unique name of the switch context.
This value is a string whose maximum size is 32.
This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree vlan 1 active
```

```
-----  
--
```

```
Spanning-tree for VLAN 1
```

```
We are the root of the Spanning Tree
```

```
Root Id      Priority    32769  
             Address     00:01:02:03:04:01  
             Cost        0  
             Port        0  
             Hello Time 2 Sec, Max Age 20 Sec, Forward Delay  
15 Sec
```

```
Spanning Tree Enabled Protocol PVRST
```

```
Bridge Id      Priority 32769  
             Address 00:01:02:03:04:01  
             Hello Time 2 sec, Max Age 20 sec, Forward Delay  
15 sec
```

Name	Role	State	Cost	Prio	Type
Gi0/1	Designated	Forwarding	200000	128	SharedLan

```
iss# show spanning-tree vlan 1 active detail
```

```
Bridge is executing the rstp compatible PVRST Protocol  
Bridge Identifier has priority 32769, Address 00:01:02:03:04:01  
Configured Hello time 2 sec, Max Age 20 sec, Forward Delay 15 sec  
We are the root of the spanning tree  
Number of Topology Changes 1  
Time since topology Change 0 seconds ago  
Transmit Hold-Count 3  
Max Age 20 Sec, Forward Delay 15 Sec, Hello Time 2 Sec
```

```

Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000 , Port Priority 128 , Port Identifier
128.1
Designated Root has priority 32769, address 00:01:02:03:04:01
Designated Bridge has priority 32769, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1
No of Transitions to forwarding State :1
BPDUs : sent 745 , recieved 0

```

```

iss# show spanning-tree vlan 1 blockedports

```

```

Blocked Interfaces List:
Gi0/2,Gi0/3,Gi0/4,Gi0/5,Gi0/6,Gi0/7,Gi0/8,Gi0/9,Gi0/10,Gi0/11,
Gi0/12,Gi0/13,Gi0/14,Gi0/15,Gi0/16,Gi0/17,Gi0/18,Gi0/19,Gi0/20,
Gi0/21,Gi0/22,Gi0/23,Gi0/24,

```

```

The Number of Blocked Ports in the system is :23

```

```

iss# show spanning-tree vlan 1 detail active

```

```

Bridge is executing the rstp compatible PVRST Protocol
Bridge Identifier has priority 32769, Address 00:01:02:03:04:01
Configured Hello time 2 sec, Max Age 20 sec, Forward Delay 15 sec
We are the root of the spanning tree
Number of Topology Changes 1
Time since topology Change 0 seconds ago
Transmit Hold-Count 3
Max Age 20 Sec, Forward Delay 15 Sec, Hello Time 2 Sec

```

```

Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000 , Port Priority 128 , Port Identifier
128.1
Designated Root has priority 32769, address 00:01:02:03:04:01
Designated Bridge has priority 32769, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1
No of Transitions to forwarding State :1
BPDUs : sent 762 , recieved 0

```

```

iss# show spanning-tree vlan 1 pathcost-method

```

```

Spanning Tree port pathcost method is Long

```

```

iss# show spanning-tree vlan 1 summary

```

```

Spanning tree enabled protocol is PVRST
Spanning-tree pathcost method is long

```

```

PVRST Port Roles and States

```

Port-Index	Port-Role	Port-State	Port-Status
-----	-----	-----	-----

1	Designated	Forwarding	Enabled
2	Designated	Forwarding	Enabled
3	Designated	Discarding	Enabled
4	Designated	Discarding	Enabled
5	Designated	Discarding	Enabled
6	Designated	Discarding	Enabled
7	Designated	Discarding	Enabled
8	Designated	Discarding	Enabled
9	Designated	Discarding	Enabled
10	Designated	Discarding	Enabled
11	Designated	Discarding	Enabled
12	Designated	Discarding	Enabled
13	Designated	Discarding	Enabled
14	Designated	Discarding	Enabled
15	Designated	Discarding	Enabled
16	Designated	Discarding	Enabled
17	Designated	Discarding	Enabled
18	Designated	Discarding	Enabled
19	Designated	Discarding	Enabled
20	Designated	Discarding	Enabled
21	Designated	Discarding	Enabled
22	Designated	Discarding	Enabled
23	Designated	Discarding	Enabled
24	Designated	Discarding	Enabled

Multiple Instance:

```
iss# show spanning-tree
```

```
Switch default
```

```
-----
--
```

```
Spanning-tree for VLAN 1
```

```
We are the root of the Spanning Tree
```

```
Root Id          Priority    32769
                  Address     00:01:02:03:04:01
                  Cost        0
                  Port        0
                  Hello Time 2 Sec, Max Age 20 Sec, Forward Delay
15 Sec
```

```
Spanning Tree Enabled Protocol PVRST
```

```
Bridge Id        Priority 32769
                  Address 00:01:02:03:04:01
                  Hello Time 2 sec, Max Age 20 sec, Forward Delay
```

```
15 sec
```

Name	Role	State	Cost	Prio	Type
Gi0/1	Designated	Forwarding	200000	128	SharedLan

```
iss# show spanning-tree vlan 1 active
```

```
Switch default
```

```
-----  
--
```

```
Spanning-tree for VLAN 1
```

```
We are the root of the Spanning Tree
```

```
Root Id      Priority    32769  
Address      00:01:02:03:04:01  
Cost         0  
Port         0  
Hello Time 2 Sec, Max Age 20 Sec, Forward Delay
```

```
15 Sec
```

```
Spanning Tree Enabled Protocol PVRST
```

```
Bridge Id      Priority 32769  
Address 00:01:02:03:04:01  
Hello Time 2 sec, Max Age 20 sec, Forward Delay
```

```
15 sec
```

Name	Role	State	Cost	Prio	Type
-----	-----	-----	-----	-----	-----
Gi0/1	Designated	Forwarding	200000	128	SharedLan

```
iss# show spanning-tree vlan 1 active detail switch default
```

```
Switch default
```

```
Bridge is executing the rstp compatible PVRST Protocol  
Bridge Identifier has priority 32769, Address 00:01:02:03:04:01  
Configured Hello time 2 sec, Max Age 20 sec, Forward Delay 15 sec  
We are the root of the spanning tree  
Number of Topology Changes 1  
Time since topology Change 0 seconds ago  
Transmit Hold-Count 3  
Max Age 20 Sec, Forward Delay 15 Sec, Hello Time 2 Sec
```

```
Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding  
Port PathCost 200000 , Port Priority 128 , Port Identifier 128.1  
Designated Root has priority 32769, address 00:01:02:03:04:01  
Designated Bridge has priority 32769, address 00:01:02:03:04:01  
Designated Port Id is 128.1, Designated PathCost 0  
Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1  
No of Transitions to forwarding State :1  
BPDUs : sent 88 , recieved 0
```

```
iss# show spanning-tree vlan 1 blockedports switch default
```

```
Switch default
```

```
Blocked Interfaces List:  
The Number of Blocked Ports in the system is :0
```

```
iss# show spanning-tree vlan 1 detail active switch default
```

```
Switch default
```

```

Bridge is executing the rstp compatible PVRST Protocol
Bridge Identifier has priority 32769, Address 00:01:02:03:04:01
Configured Hello time 2 sec, Max Age 20 sec, Forward Delay 15 sec
We are the root of the spanning tree
Number of Topology Changes 1
Time since topology Change 0 seconds ago
Transmit Hold-Count 3
Max Age 20 Sec, Forward Delay 15 Sec, Hello Time 2 Sec

```

```

Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000 , Port Priority 128 , Port Identifier
128.1
Designated Root has priority 32769, address 00:01:02:03:04:01
Designated Bridge has priority 32769, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1
No of Transitions to forwarding State :1
BPDUs : sent 110 , recieved 0

```

```
iss# show spanning-tree vlan 1 pathcost-method switch default
```

```
Switch default
```

```
Spanning Tree port pathcost method is Long
```

```
iss# show spanning-tree vlan 1 summary switch default
```

```
Switch default
```

```
Spanning tree enabled protocol is PVRST
```

```
Spanning-tree pathcost method is long
```

```
PVRST Port Roles and States
```

Port-Index	Port-Role	Port-State	Port-Status
1	Designated	Discarding	Enabled
2	Designated	Forwarding	Enabled



- This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.
- The configuration can be done only for the VLANs that are activated in the switch.

Related Commands

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree compatibility** - Sets the STP compatibility version in the switch for all ports.
- **spanning-tree transmit hold-count** - Sets the transmit hold-count value for the switch.

- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree - Properties of an interface** - Configures the port related spanning tree information for all kinds of STPs.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.3.9 show spanning-tree vlan - bridge

This command displays the PVRT related information of the bridge for the specified VLAN ID. The information contain bridge ID, hello time, maximum age, forward delay and STP mode set.

```
show spanning-tree vlan <vlan-id(1-4094)> bridge [{address | detail | forward-  
time | hello-time | id | max-age | priority [system-id] | protocol}][ switch  
<context_name>]
```

Syntax	vlan-id	- Displays the PVRST related information of the bridge for the specified VLAN ID. This is a unique value that represents the specific VLAN created. This value ranges between 1 and 4094.
Description	address	- Displays the address of the bridge.
	detail	- Displays the detailed PVRST related information for the bridge. This information contain bridge priority, bridge address, hello time, maximum age and forward delay.
	forward-time	- Displays the forward delay value of the bridge.
	hello-time	- Displays the hello time value of the bridge.
	id	- Displays the ID of the bridge.
	max-age	- Displays the maximum age of the bridge.
	priority [system-id]	- priority - Displays the priority of the bridge. system-id - Displays the address of the bridge.
	protocol	- Displays the type of STP executed in the bridge.
	switch	- Displays the PVRST related information of the bridge, for the specified context. This value represents unique name of the switch context. This value is a string whose maximum size is 32. This parameter is specific to multiple instance feature.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example **Single Instance:**

```
iss# show spanning-tree vlan 1 bridge
```

```
Bridge ID          HelloTime MaxAge FwdDly Protocol
-----
80:00:00:01:02:03:04:01  2         20    15    Pvrst
```

```
iss# show spanning-tree vlan 1 bridge address
```

```
Bridge Address is 00:01:02:03:04:01
```

```
iss# show spanning-tree vlan 1 bridge detail
```

```
Bridge Id          Priority 32769,
                   Address 00:01:02:03:04:01
                   Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
```

```
iss# show spanning-tree vlan 1 bridge forward-time
```

```
Bridge Forward delay is 15 sec
```

```
iss# show spanning-tree vlan 1 bridge hello-time
```

```
Bridge Hello Time is 2 sec
```

```
iss# show spanning-tree vlan 1 bridge id
```

```
Bridge ID is 80:00:00:01:02:03:04:01
```

```
iss# show spanning-tree vlan 1 bridge max-age
```

```
Bridge Max Age is 20 sec
```

```
iss# show spanning-tree vlan 1 bridge priority
```

```
Bridge Priority is 32769
```

```
iss# show spanning-tree vlan 1 bridge priority system-id
```

```
Bridge Address is 00:01:02:03:04:01
```

```
iss# show spanning-tree vlan 1 bridge protocol
```

```
Bridge Protocol Running is PVRST
```

Multiple Instance:

```
iss# show spanning-tree vlan 1 bridge switch default
```

```
Switch default
```

```
Bridge ID          HelloTime MaxAge FwdDly Protocol
-----
```

```
80:00:00:01:02:03:04:01    2        20    15    Pvrst
iss# show spanning-tree vlan 1 bridge address

Switch default

Bridge Address is 00:01:02:03:04:01
iss# show spanning-tree vlan 1 bridge detail switch default

Switch default

Bridge Id          Priority 32769,
                  Address 00:01:02:03:04:01
                  Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
iss# show spanning-tree vlan 1 bridge forward-time switch default

Switch default

Bridge Forward delay is 15 sec

iss# show spanning-tree vlan 1 bridge hello-time switch default

Switch default

Bridge Hello Time is 2 sec
iss# show spanning-tree vlan 1 bridge id switch default

Switch default

Bridge ID is 80:00:00:01:02:03:04:01
iss# show spanning-tree vlan 1 bridge max-age switch default

Switch default

Bridge Max Age is 20 sec switch default
iss# show spanning-tree vlan 1 bridge priority

Switch default

Bridge Priority is 32769
iss# show spanning-tree vlan 1 bridge priority system-id switch
default

Switch default

Bridge Address is 00:01:02:03:04:01

iss# show spanning-tree vlan 1 bridge protocol switch default

Switch default

Bridge Protocol Running is PVRST
iss# show spanning-tree vlan 1 bridge switch default

Switch default

Bridge ID          HelloTime MaxAge FwdDly Protocol
```

```
-----  
80:00:00:01:02:03:04:01    2    20    15    Pvrst
```



- This command can be executed successfully, only if the spanning tree functionality is not shutdown in the switch. The type of spanning tree mode should be set as pvrst.
- The configuration can be done only for the VLANs that are activated in the switch.

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.3.10 show spanning-tree vlan - root

This command displays the PVRT related information of the root, for the specified VLAN ID. The information contain root ID, root cost, hello time, maximum age, forward delay and root port.

```
show spanning-tree vlan <vlan-id(1-4094)> root [{address | cost | detail |
forward-time | hello-time | id | max-age | port | priority [system-id] }][
switch <context_name>]
```

Syntax	vlan-id	- Displays the PVRST related information of the root for the specified VLAN ID.
Description		This is a unique value that represents the specific VLAN created.
		This value ranges between 1 and 4094.
	address	- Displays the address of the root.
	cost	- Displays the cost of the root.
	detail	- Displays the detailed PVRST related information for the root.
		This information contain root priority, root address, root cost, root port, hello time, maximum age and forward delay.
	forward-time	- Displays the forward delay value of the root.
	hello-time	- Displays the hello time value of the root.
	id	- Displays the ID of the root.
	max-age	- Displays the maximum age of the root.
	port	- Displays the root port ID.
	priority [system-id]	- priority - Displays the priority of the root. system-id - Displays the address of the root.
	switch	- Displays the PVRST related information of the root, for the specified context.
		This value represents unique name of the switch context.
		This value is a string whose maximum size is 32.
		This parameter is specific to multiple instance

feature.

Mode Privileged EXEC Mode**Package** Workgroup, Enterprise and Metro**Example** **Single Instance:**

```
iss# show spanning-tree vlan 1
```

```
-----
--

Spanning-tree for VLAN 1

We are the root of the Spanning Tree
Root Id          Priority    32769
                Address    00:01:02:03:04:01
                Cost       0
                Port       0
                Hello Time 2 Sec, Max Age 20 Sec, Forward Delay
15 Sec
```

```
Spanning Tree Enabled Protocol PVRST
Bridge Id        Priority 32769
                Address 00:01:02:03:04:01
                Hello Time 2 sec, Max Age 20 sec, Forward Delay
15 sec
Name      Role      State      Cost      Prio    Type
----      -
Gi0/1     Designated Forwarding 200000    128      SharedLan
```

```
iss# show spanning-tree vlan 1 root
```

```
Root ID          RootCost HelloTime MaxAge FwdDly RootPort
-----
-
80:01:00:01:02:03:04:01 0          2      20      15      0
```

```
iss# show spanning-tree vlan 1 root address
```

```
Root Bridge Address is 00:01:02:03:04:01
```

```
iss# show spanning-tree vlan 1 root cost
```

```
Root Cost is 0
```

```
iss# show spanning-tree vlan 1 root detail
```

```
We are the root of the Spanning Tree
Root Id          Priority    32769
                Address    00:01:02:03:04:01
                Cost       0
                Port       0
                Hello Time 2 Sec, Max Age 20 Sec, Forward Delay
```

15 Sec

```
iss# show spanning-tree vlan 1 root forward-time
```

Forward delay is 15 sec

```
iss# show spanning-tree vlan 1 root hello-time
```

Hello Time is 2 sec

```
iss# show spanning-tree vlan 1 root id
```

Root Bridge Id is 80:01:00:01:02:03:04:01

```
iss# show spanning-tree vlan 1 root max-age
```

Root MaxAge is 20

```
iss# show spanning-tree vlan 1 root port
```

Root Port is 0

```
iss# show spanning-tree vlan 1 root priority
```

Root Priority is 32769

Multiple Instance:

```
iss# show spanning-tree vlan 1 root switch default
```

Switch default

Root ID	RootCost	HelloTime	MaxAge	FwdDly	RootPort
80:01:00:01:02:03:04:01	0	2	20	15	0

-

80:01:00:01:02:03:04:01 0 2 20 15 0

```
iss# show spanning-tree vlan 1 root address switch default
```

Switch default

Root Bridge Address is 00:01:02:03:04:01

```
iss# show spanning-tree vlan 1 root cost
```

Switch default

Root Cost is 0

```
iss# show spanning-tree vlan 1 root detail switch default
```

Switch default

We are the root of the Spanning Tree

Root Id	Priority	32769
	Address	00:01:02:03:04:01
	Cost	0
	Port	0

```

Hello Time 2 Sec, Max Age 20 Sec, Forward Delay
15 Sec
iss# show spanning-tree vlan 1 root forward-time

Switch default

Forward delay is 15 sec
iss# show spanning-tree vlan 1 root hello-time switch default

Switch default

Hello Time is 2 sec
iss# show spanning-tree vlan 1 root id switch default

Switch default

Root Bridge Id is 80:01:00:01:02:03:04:01

iss# show spanning-tree vlan 1 root max-age switch default

Switch default

Root MaxAge is 20

iss# show spanning-tree vlan 1 root port switch default

Switch default

Root Port is 0
iss# show spanning-tree vlan 1 root priority switch default

Switch default

Root Priority is 32769
iss# show spanning-tree vlan 1 root priority system-id switch
default

Switch default
```

**Related
Command**

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

18.3.11 show spanning-tree vlan - interface

This command displays interface specific PVRST information for the specified VLAN. The information contain port role, port state, port cost and port priority.

```
show spanning-tree vlan <vlan-id(1-4094)> interface <ifXtype> <ifnum> [{ cost
| detail | priority | rootcost | state | stats }]
```

Syntax **vlan-id**
Description

- Displays the interface specific PVRST related information for the specified VLAN ID.

This is a unique value that represents the specific VLAN created.

This value ranges between 1 and 4094.

ifXtype

- Displays the interface specific PVRST related information for the specified type of interface. The interface can be:
 - fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
 - gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second.
 - extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
 - internal-lan – Internal LAN created on a bridge per IEEE 802.1ap.
 - port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.

ifnum

- Displays the interface specific PVRST related information for the specified interface identifier. This is a unique value that represents the specific interface.

This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.

For example: 0/1 represents that the slot number is 0 and port number is 1.

Only i-lan and port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.

cost	- Displays the cost of the specified port.
detail	- Displays detailed interface specific PVRST related information for the port. The information contain port role, port state, bridge and root priority, bridge and root addresses, port path cost, port priority, port timers, and number of BPDUs sent and received through the port.
priority	- Displays the priority of the specified port.
rootcost	- Displays the root cost of the port. The root cost defines the pathcost to reach the root bridge.
state	- Displays the state of the port.
stats	- Displays the port level spanning tree statistics information.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example Single Instance:

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1
```

```
Role          State          Cost          Prio
----          -
Designated    Forwarding    200000        128
```

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1 cost
```

```
Port cost is 200000
```

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1
detail
```

```
Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding
Port PathCost 200000 , Port Priority 128 , Port Identifier
128.1
Designated Root has priority 32769, address 00:01:02:03:04:01
Designated Bridge has priority 32769, address 00:01:02:03:04:01
Designated Port Id is 128.1, Designated PathCost 0
Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1
No of Transitions to forwarding State :1
BPDUs : sent 59 , recieved 0
```

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1
priority
```

Port Priority is 128

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
rootcost
```

Root Cost is 0

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
state
```

Forwarding

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
stats
```

Statistics for Port Gi0/1

```
Number of Transitions to forwarding State : 1  
Number of RSTP BPDU Count received       : 0  
Number of Config BPDU Count received     : 0  
Number of TCN BPDU Count received        : 0  
Number of RSTP BPDU Count Transmitted    : 97  
Number of Config BPDU Count Transmitted  : 0  
Number of TCN BPDU Count Transmitted     : 0  
Port Protocol Migration Count            : 0
```

Multiple Instance:

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1 cost
```

Switch default

Port cost is 200000

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
detail
```

Switch default

Port 1 [Gi0/1] of VLAN 1 is Designated, Forwarding

Port PathCost 200000 , Port Priority 128 , Port Identifier 128.1

Designated Root has priority 32769, address 00:01:02:03:04:01

Designated Bridge has priority 32769, address 00:01:02:03:04:01

Designated Port Id is 128.1, Designated PathCost 0

Timers: Hello Time - 2, MaxAge - 20, Forward Delay - 15, Hold - 1

No of Transitions to forwarding State :1

BPDU's : sent 233 , recieved 0

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
priority
```

Switch default

Port Priority is 128

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1  
rootcost
```

Switch default

Root Cost is 0

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1
state
```

Switch default

Forwarding

```
iss# show spanning-tree vlan 1 interface gigabitethernet 0/1
stats
```

Switch default

Statistics for Port Gi0/1

```
Number of Transitions to forwarding State : 1
Number of RSTP BPDU Count received       : 0
Number of Config BPDU Count received     : 0
Number of TCN BPDU Count received        : 0
Number of RSTP BPDU Count Transmitted    : 261
Number of Config BPDU Count Transmitted  : 0
Number of TCN BPDU Count Transmitted     : 0
Port Protocol Migration Count            : 0
```

Related Command

- **shutdown spanning-tree** - Shuts down spanning tree functionality in the switch.
- **spanning-tree** - Enables the spanning tree operation in the switch for the selected spanning tree mode.
- **spanning-tree mode** - Sets the type of spanning tree to be executed, enables spanning tree operation and starts spanning tree functionality in the switch.
- **clear spanning-tree counters** - Deletes all bridge and port level spanning tree statistics information.
- **spanning-tree layer2-gateway-port** - Configures a port to operate as a L2GP.
- **spanning-tree - Pseudoroot configuration** - Configures the pseudoroot related information for a port set as L2GP.
- **spanning-tree vlan** - Configures spanning tree related information on a per VLAN basis.
- **spanning-tree vlan status** - Configures the status of PVRST on a port for the specified VLAN.
- **spanning-tree vlan port-priority** - Configures the priority of a port for the specified VLAN.
- **spanning-tree vlan cost** - Configures the cost of a port for the specified VLAN.
- **vlan active** - Activates a VLAN in the switch.
- **base-mac** - Configures the base unicast MAC address of the switch in the NVRAM.

Chapter

19

LA

LA (Link Aggregation) is a method of combining physical network links into a single logical link for increased bandwidth. LA increases the capacity and availability of the communications channel between devices (both switches and end stations) using existing Fast Ethernet and Gigabit Ethernet technology. LA also provides load balancing where the processing and communication activity is distributed across several links in a trunk, so that no single link is overwhelmed. By taking multiple LAN connections and treating them as a unified, aggregated link, practical benefits in many applications is achieved. LA provides the following important benefits:

- Higher link availability
- Increased link capacity
- Improvements are obtained using existing hardware (no upgrading to higher-capacity link technology is necessary)

The list of CLI commands for the configuration of LA is as follows:

- shutdown port-channel
- set port-channel
- channel-protocol
- lacp system-priority
- lacp system-identifier
- port-channel load-balance
- lacp port-priority
- lacp port-identifier

ISS

- channel-group
- lacp wait-time
- lacp timeout
- lacp rate
- lacp admin-key
- default port
- port-channel max-ports
- debug lacp
- debug etherchannel
- show etherchannel
- show interfaces - etherchannel
- show lacp

19.1 shutdown port-channel

This command shuts down LA in the switch and releases the allocated resources to the switch.

The no form of the command starts and enables LA in the switch, and allocates required memory to the LA module. The LA feature is made available in the switch only if the LA is enabled in the switch.

LA feature allows you to aggregate individual point-to-point links into a port channel group, so that the capacity and availability of the communications channel between devices are increased using the existing interface technology.

shutdown port-channel

no shutdown port-channel

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults LA is started in the switch, but not enabled. That is LA operational status is disabled.

Example `iss(config)# shutdown port-channel`



LA cannot be started in the switch, if the base bridge mode is configured as transparent bridging.

Related Commands

- **set port-channel** - Configures the admin status of LA in the switch.
- **lACP system-priority** - Configures the LACP priority that is associated with actor's system ID.
- **lACP system-identifier** - Configures the global LACP system ID.
- **port-channel load-balance** - Configures the load balancing policy for all port channels created in the switch.
- **lACP port-priority** - Configures the LACP port priority.
- **lACP port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **lACP wait-time** - Configures the LACP wait-time for an interface.
- **lACP timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **lACP admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port

channel.

- **port-channel max-ports** - Configures the maximum number of ports that can be attached to a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
- **show lacp** - Displays LACP counter / neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows to configure interface such as out of band management, port channel, tunnel and so on.
- **base bridge-mode** - Configures the mode in which the VLAN feature should operate on the switch.

19.2 set port-channel

This command configures the admin status of LA in the switch. The LA feature is made available in the switch only if the LA is enabled in the switch.

LA feature allows you to aggregate individual point-to-point links into a port channel group, so that the capacity and availability of the communications channel between devices are increased using the existing interface technology.

```
set port-channel { enable | disable }
```

Syntax Description	enable	- Enables LA feature in the switch. Also starts the LA in the switch if the LA is shutdown.
	disable	- Disables LA feature in the switch.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults disable

Example `iss(config)# set port-channel enable`

Related Command	• shutdown port-channel - Shuts down LA in the switch and releases the allocated resources to the switch.
	• lacp system-priority - Configures the LACP priority that is associated with actor's system ID.
	• lacp system-identifier - Configures the global LACP system ID.
	• port-channel load-balance - Configures the load balancing policy for all port channels created in the switch.
	• lacp port-priority - Configures the LACP port priority.
	• lacp port-identifier - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
	• channel-group - Adds the port as a member of the specified port channel that is already created in the switch.
	• lacp wait-time - Configures the LACP wait-time for an interface.
	• lacp timeout - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
	• lacp admin-key - Configures the LACP actor admin key and LACP mode for a port.
	• default port - Configures the port that should be set as default port for a port

channel.

- **port-channel max-ports** - Configures the maximum number of ports that can be attached to a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
- **show lacp** - Displays LACP counter / neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows to configure interface such as out of band management, port channel, tunnel and so on

19.3 channel-protocol

This command enables link aggregation in the switch and the no form of the command disables link aggregation in the switch.

This command is a standardized implementation of the existing command; **set port-channel..** It operates similar to the existing command.

```
channel-protocol { lacp | pagp }
```

```
no channel-protocol
```

Syntax Description	lacp	- Specifies LACP (Link Aggregation Control Protocol) to manage channeling.
---------------------------	-------------	--

	pagp	- Specifies PAgP (Port aggregation protocol) to manage channeling.
--	-------------	--

This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported.

Mode	Global Configuration Mode
-------------	---------------------------

Package	Workgroup, Enterprise and Metro
----------------	---------------------------------

Defaults	Link aggregation is disabled
-----------------	------------------------------

Example	<code>iss(config)# channel-protocol lacp</code>
----------------	---

Related Command	show etherchannel - Displays Etherchannel information
------------------------	--

19.4 lacp system-priority

This command configures the LACP priority associated with actor's system ID. This priority value ranges from 0 to 65535. The switch with the lowest LACP decides the standby and active links in the LA.

The no form of the command resets the LACP priority to its default value.

```
lacp system-priority <0-65535>
```

```
no lacp system-priority
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 32768

Example `iss(config)# lacp system-priority 5`



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Command

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.

19.5 lacp system-identifier

This command configures the global LACP system ID. The system ID denotes a 6-octet unicast MAC address value that is used as a unique identifier for the switch containing the aggregator.

The no form of the command resets the global LACP System ID to its default value.

```
lacp system-identifier <aa:aa:aa:aa:aa:aa>
```

```
no lacp system-identifier
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)#lacp system-identifier 00:01:02:03:04:05`



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Commands

- `shutdown port-channel` - Shuts down LA in the switch and releases the allocated resources to the switch.
- `set port-channel` - Configures the admin status of LA in the switch.

19.6 port-channel load-balance

This command configures the load balancing policy for all port channels created in the switch.

The no form of the command resets the load balancing policy to its default value.


The policy sets the rule for distributing the Ethernet traffic among the aggregated links to establish load balancing.

```
port-channel load-balance ([src-mac] [dest-mac] [src-dest-mac] [src-ip] [dest-
ip] [src-dest-ip] [vlan-id] [service-instance] [mac-src-vid] [mac-dest-vid] [mac-
src-dest-vid] [dest-ip6] [src-ip6] [l3-protocol] [dest-l4-port] [src-l4-port] [mpls-
vc-label] [mpls-tunnel-label] [mpls-vc-tunnel-label]) [<port-channel-index(1-
65535)>]
```

```
no port-channel load-balance [ <port-channel-index(1-65535)> ]
```

Syntax Description n	src-mac	<ul style="list-style-type: none"> - Distributes the load based on the source MAC address. <p>The bits of the source MAC address in the packet are used to select the port in which the traffic should flow.</p> <p>Packets from different hosts use different ports in the channel, but packets from the same host use the same port</p>
	dest-mac	<ul style="list-style-type: none"> - Distributes the load based on the destination host MAC address. <p>The bits of the destination MAC address in the packet are used to select the port in which the traffic should flow.</p> <p>Packets to the same destination are sent on the same port, but packets to different destinations are sent on different ports in the channel</p>
	src-dest-mac	<ul style="list-style-type: none"> - Distributes the load based on the source and destination MAC address. <p>The bits of the source and destination MAC address in the packet are used to select the port in which the traffic should flow.</p>
	src-ip	<ul style="list-style-type: none"> - Distributes the load based on the source IP address. <p>The bits of the source IP address in the packet are used to select the port in which the traffic should flow.</p>
	dest-ip	<ul style="list-style-type: none"> - Distributes the load based on the destination IP address. <p>The bits of the destination IP address in the packet are used to select the port in which the traffic should flow.</p>

src-dest-ip	<ul style="list-style-type: none"> - Distributes the load based on the source and destination IP address. The bits of the source and destination IP address in the packet are used to select the port in which the traffic should flow.
vlan-id	<ul style="list-style-type: none"> - Distributes the load distribution based on VLAN ID. The VLAN ID in the packet is used to select the port in which the traffic should flow.
service-instance	<ul style="list-style-type: none"> - Distributes the load based on service-instance. The ISID in the packet is used to select the port in which the traffic should flow. Packets with the same service-instance use the same port. Packets with different service-instance use different ports such that the load is balanced among ports. The port can have packets with different service-instances also.
mac-src-vid	<ul style="list-style-type: none"> - Distributes the load based on source MAC address and VLAN ID. The VLAN ID and source MAC address in the packet are used to select the port in which the traffic should flow.
mac-dest-vid	<ul style="list-style-type: none"> - Distributes the load based on destination MAC address and VLAN ID. The VLAN ID and destination MAC address in the packet are used to select the port in which the traffic should flow.
mac-src-dest-vid	<ul style="list-style-type: none"> - Distributes the load based on VLAN ID, and destination and source MAC address. The VLAN ID, source MAC address and destination MAC address in the packet are used to select the port in which the traffic should flow.
dest-ip6	<ul style="list-style-type: none"> - Load distribution is based on the destination IP6 address
src-ip6	<ul style="list-style-type: none"> - Load distribution is based on the source IP6 address
l3-protocol	<ul style="list-style-type: none"> - Load distribution is based on the Layer 3 protocol.
dest-l4-port	<ul style="list-style-type: none"> - Load distribution is based on the destination Layer 4 port.
src-l4-port	<ul style="list-style-type: none"> - Load distribution is based on the source Layer 4 port.

	mpls-vc-label - Distributes the load based on MPLS VC label. The MPLS VC label in the packet is used to select the port in which the traffic should flow.
	mpls-tunnel-label - Distributes the load based on MPLS tunnel label. The MPLS tunnel label in the packet is used to select the port in which the traffic should flow.
	mpls-vc-tunnel-label - Distributes the load based on MPLS VC and tunnel labels. The MPLS VC and tunnel labels in the packet are used to select the port in which the traffic should flow.
	port-channel-index - Configures the load balancing policy for the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535.
Mode	Global Configuration Mode
Package	Workgroup, Enterprise and Metro
Defaults	src-dest-mac
Example	<pre>iss(config)# port-channel load-balance dest-mac 1</pre>
	 This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
Related Command	<ul style="list-style-type: none"> • shutdown port-channel - Shuts down LA in the switch and releases the allocated resources to the switch. • set port-channel - Configures the admin status of LA in the switch. • show etherchannel - Displays Etherchannel information for all port-channel groups created in the switch. • interface-configuration and deletion - Allows to configure interface such as out of band management, port channel, tunnel and so on

19.7 lacp port-priority

This command configures the LACP port priority.

The no form of the command resets the LACP port priority to its default value.

This port priority is used in combination with LACP port identifier during the identification of best ports in a port channel. The priority determines if the link is an active link or a standby link, when the number of ports in the aggregation exceeds the maximum number supported by the hardware. The links with lower priority becomes active links.

This value ranges from 0 to 65535

lacp port-priority <0-65535>

no lacp port-priority

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults 128

Example `iss(config-if)# lacp port-priority 1`



- This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
- This configuration takes effect only on the interface that is configured for LACP.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **default port** - Configures the port that should be set as default port for a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
- **show lacp** - Displays LACP counter / neighbor information for all port-channels.

19.8 lacp port-identifier

This command configures the LACP actor admin port ID to be filled in the LACP PDUs. This value represents the concerned aggregation port. This value ranges from 1 to 65535.

The maximum limit depends on the board. For example, if the board has only 24 ports, then the maximum value will be 24 only. That is the value ranges from 1 to 24.

lacp port-identifier <1-65535>

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults The port ID is set as the LACP actor admin port ID.

Example `iss(config-if)# lacp port-identifier 2`



- This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
- This configuration takes effect only on the interface that is configured for LACP.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **default port** - Configures the port that should be set as default port for a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.

19.9 channel-group

This command adds the port as a member of the specified port channel that is already created in the switch.

The no form of the command deletes the aggregation of the port from all port channels.

```
channel-group <channel-group-number(1-65535)> mode {auto [non-silent] |
desirable [non-silent] | on | active | passive }
```

```
no channel-group
```

Syntax Description	<channel-group-number(1-65535)>	- Adds the port as a member of the specified port channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535.
	mode	- Configures the LACP activity for the port: auto - Places a port into a passive negotiating state in which the port responds to received PAgP packets, but does not initiate PAgP packet negotiation. This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported. desirable - Places a port into an active negotiating state in which the port initiates negotiations with other ports by sending PAgP packets. This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported. [non-silent] - Used with the auto or desirable keyword when traffic is expected from the other device. This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported. active - Starts LACP negotiation un-conditionally. passive - Starts LACP negotiation only when LACP packet is received from peer. on - Forces the interface to channel without LACP. This is equivalent to manual aggregation.

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Example `iss(config-if)# channel-group 1 mode active`



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Command

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **default port** - Configures the port that should be set as default port for a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
- **show lacp** - Displays LACP counter / neighbor information for all port-channels.
- **interface-configuration and deletion** - Allows to configure interface such as out of band management, port channel, tunnel and so on.

19.10 lacp wait-time

This command configures the LACP wait-time for an interface.

The no form of the command resets the LACP wait-time to its default value.

The wait time represent the time (in seconds) till which the port waits before entering into aggregation after receiving partner information (that is, this represents the time taken to attach to the port channel).

This value ranges from 0 to 10 seconds.

lacp wait-time <0-10>

no lacp wait-time

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults 2

Example `iss(config-if)# lacp wait-time 1`



- This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
- This configuration takes effect only on the interface that is configured for LACP.

Related Command

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **default port** - Configures the port that should be set as default port for a port channel.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.

19.11 lacp timeout

This command configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.

The no form of the command sets the LACP timeout period to its default value.

```
lacp timeout {long | short }
```

```
no lacp timeout
```

Syntax Description	long	- Configures the LACP timeout period as 90 seconds. The LACP PDU is sent every 30 seconds.
	short	- Configures the LACP timeout period as 3 seconds. The LACP PDU is sent every second.

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults long

Example `iss(config-if)# lacp timeout short`



- This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
- This configuration takes effect only on the interface that is configured for LACP.

- Related Command**
- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
 - **set port-channel** - Configures the admin status of LA in the switch.
 - **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
 - **default port** - Configures the port that should be set as default port for a port channel.
 - **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
 - **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
 - **show lacp** - Displays LACP counter / neighbor information for all port-channels.

19.12 lacp rate

This command sets the LACP timeout period and the no form of the command sets the LACP timeout period to the default value

This command is a standardized implementation of the existing command; **lacp timeout**. It operates similar to the existing command.

```
lacp rate {normal | fast }
```

```
no lacp rate
```

**Syntax
Description****normal**

- LACP control packets are ingressed at the normal rate. That is, LACP PDU will be sent every 30 seconds and the timeout value will be set as 90 seconds.

fast

- LACP control packets are ingressed at the fast rate. That is, LACP PDU will be sent every 1 second and the timeout value will be set as 3 seconds.

Mode

Interface Configuration Mode

Package

Workgroup, Enterprise and Metro

Defaults

normal

Example

```
iss(config-if)# lacp rate fast
```



- The normal timeout value means that LACP PDU will be sent every 30 seconds and LACP timeout value (no packet is received from peer) is 90 seconds.
- The fast timeout value means that LACP PDU will be sent every 1 second and timeout value is 3 seconds.

**Related
Command****show etherchannel** - Displays Etherchannel detailed / port information

19.13 lacp admin-key

This command configures the LACP actor admin key and LACP mode for a port.

```
lacp admin-key <(Admin Key)1-65535> [mode {active | passive}]
```

Syntax Description	admin-key	-	Configures the LACP actor admin key that is used while port participates in dynamic aggregation selection. The port is made as part of best aggregation selected based on system ID and admin key. This value ranges from 1 to 65535.
	mode	-	Configures the LACP mode for the port. The different options are: <ul style="list-style-type: none"> • active - Starts LACP negotiation un-conditionally. • passive - Starts LACP negotiation only when LACP packet is received from peer.

Mode Interface Configuration Mode (Physical Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults mode - active

Example `iss(config-if)# lacp admin-key 1 mode active`



- This command can be executed successfully, only if the LA functionality is started and enabled in the switch.
- The admin key can be configured only for ports that select aggregator dynamically (that is, the port is configured as default interface for a port channel)

Related Command	•	shutdown port-channel - Shuts down LA in the switch and releases the allocated resources to the switch.
	•	set port-channel - Configures the admin status of LA in the switch.
	•	default port - Configures the port that should be set as default port for a port channel.
	•	show etherchannel - Displays Etherchannel information for all port-channel groups created in the switch.
	•	show interfaces - etherchannel - Displays Etherchannel details for all aggregated ports and port channels.
	•	show lacp - Displays LACP counter / neighbor information for all port-channels.

19.14 default port


This command configures the port that should be set as default port for a port channel.

The no form of the command deletes the default port assigned for the port channel.

The configured port attaches with the port channel and participates only in dynamic aggregation selection.

default port <interface-type> <interface-id>

no default port

Syntax Description	<interface-type>	<ul style="list-style-type: none"> - Configures the type of interface to be set as default port for the port channel. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
	<interface-id>	<ul style="list-style-type: none"> - Configures the ID of the interface to be set as default port. This is a unique value that represents the specific interface. <p>This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan.</p> <p>For example: 0/1 represents that the slot number is 0 and port number is 1.</p> <p>Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.</p>
Mode	Interface Configuration Mode (Port Channel Interface Mode)	
Package	Workgroup, Enterprise and Metro	
Example	<pre>iss(config-if)# default port gigabitethernet 0/1</pre>	
	<ul style="list-style-type: none"> • This command can be executed successfully, only if the LA functionality is started and enabled in the switch. 	

- Only one port can be set as a default port.
- The port that is to be set as default port should have not been added as a member port for any of the port channel.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **no channel-group** - Deletes the aggregation of the port from all port channels.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **show etherchannel** - Displays Etherchannel information for all port-channel groups created in the switch.
- **show interfaces - etherchannel** - Displays Etherchannel details for all aggregated ports and port channels.
- **show lacp** - Displays LACP counter / neighbor information for all port-channels.

19.15 port-channel max-ports

This command configures the maximum number of ports that can be attached to a port channel. This value ranges from 2 to 8.

The best ports are maintained in active state and other ports are maintained in standby state, if the total number of ports attached to the port-channel exceeds the configured value.

port-channel max-ports <integer (2-8)>

Mode Interface Configuration Mode (Port Channel Interface Mode)

Package Workgroup, Enterprise and Metro

Defaults 8

Example `iss(config-if)# port-channel max-ports 5`



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.

19.16 debug lacp

This command enables the tracing of the LACP as per the configured debug levels. The trace statements are generated for the configured trace levels.

The no form of the command disables the tracing of the LACP as per the configured debug levels. The trace statements are not generated for the configured trace levels

This command allows combination of debug levels to be configured (that is, more than one level of trace can be enabled or disabled). The debug levels are configured one after the other and not in single execution of the command.

```
debug lacp [ { init-shutdown | mgmt | data | events | packet | os | failall |
buffer | all } ]
```

```
no debug lacp [ { init-shutdown | mgmt | data | events | packet | os | failall
| buffer | all } ]
```

Syntax Description

- | | |
|----------------------|---|
| init-shutdown | - Generates debug statements for init and shutdown traces.
These traces are generated during module initialization and shutdown. |
| mgmt | - Generates debug statements for management traces.
This trace is generated whenever you configure any of the LA features. |
| data | - Generates debug statements for data path traces.
This trace is generated during failure in packet processing. |
| events | - Generates debug statements for event traces.
This trace is generated when any of packets are sent successfully or when an ACK is received. |
| packet | - Generates debug statements for packet dump traces.
This trace is generated for all events generated during processing of packets. |
| os | - Generates debug statements for OS resource related traces.
This trace is generated during failure in message queues. |
| failall | - Generates debug statements for all kind of failure traces. |

buffer - Generates debug statements for buffer related traces.

all - Generates debug statements for all kinds of traces.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults init-shutdown

Example iss# debug lacp data

19.17 debug etherchannel

This command enables trace messages for link aggregation and the no form of the command disables trace messages for link aggregation.

This command is a standardized implementation of the existing command; **debug lacp**. It operates similar to the existing command.

```
debug etherchannel {[all] [detail] [error] [event] [idb]}
```

```
no debug etherchannel {[all] [detail] [error] [event] [idb]}
```

Syntax Description	all	- All traces
	detail	- Detailed debug traces
	error	- All failure traces
	<u>event</u>	- Event traces
	<u>idb</u>	- Interface descriptor block messages

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example iss# debug etherchannel detail

19.18 show etherchannel

This command displays Etherchannel information for all port-channel groups created in the switch. This information contains admin and oper status of port-channel module, and status of protocol operate mode for each group.

If the switch L2RED WANTED is set as no during compilation of exe:

```
show etherchannel [[channel-group-number] { detail | load-balance | port |
port-channel | summary | protocol}]
```

If the switch L2RED WANTED is set as yes during compilation of exe:

```
show etherchannel [[channel-group-number] { detail | load-balance | port |
port-channel | summary | protocol | redundancy}]
```

Syntax Description	channel-group-number	- Displays Etherchannel information for the specified port-channel group. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535.
	detail	- Displays detailed Etherchannel information. The information contain admin and oper status of port channel module, LACP system priority, status of protocol operate mode for each group, port details for each group and port channel details. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state, and LACP port-priority, wait-time, port identifier, activity and timeout. The port channel details contain port channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC and default port ID.
	load-balance	- Displays the load balancing policy applied for each port-channel groups.
	port	- Displays the status of protocol operate mode and port details for each group. The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port

	number, port state, and LACP port-priority, wait-time, port identifier, activity and timeout.
port-channel	<ul style="list-style-type: none"> - Displays the admin and oper status of port channel module, and port channel details. <p>The port channel details contain port channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC and default port ID.</p>
summary	<ul style="list-style-type: none"> - Displays the admin and oper status of port channel module, number of channel groups used, number of aggregators, group IDs, and port channel ID, status of protocol operate mode and member ports for each group.
protocol	<ul style="list-style-type: none"> - Displays the status of protocol operate mode for each port-channel group.
redundancy	<ul style="list-style-type: none"> - Displays the actor information and synchronized partner information for the port, port state flags decode information, and aggregation state. <p>The actor information contain channel group ID, pseudo port channel ID and currentwhile split interval timer count value.</p> <p>The partner information contains partner system ID, flags, LACP partner port priority and LACP partner oper key.</p> <p>The decode information contain LACP activity and LACP timeout.</p>

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```

iss# show etherchannel

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel System Identifier is 00:01:02:03:04:01

                        Channel Group Listing
                        -----
Group : 1
-----
Protocol : LACP

iss# show etherchannel 1 detail

Port-channel Module Admin Status is enabled

```

```

Port-channel Module Oper Status is enabled
Port-channel System Identifier is 00:01:02:03:04:01
LACP System Priority: 32768

```

Channel Group Listing

```

Group: 1
-----
Protocol :LACP

```

Ports in the Group

```

Port : Gi0/1
-----

```

```

Port State = Up in Bundle
Channel Group : 1
Mode : Active
Pseudo port-channel = Po1
LACP port-priority = 128
LACP Wait-time = 2 secs
LACP Activity : Active
LACP Timeout : Long

```

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,
Defaulted

```

Port	State	LACP Port Priority	Admin Key	Oper Key	Port Number	Port State
Gi0/1	Bundle	128	1	1	0x1	0xbe

```

Port-channel : Po1
-----

```

```

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Aggregator-MAC 00:01:02:03:04:19
Default Port = None

```

```

iss# show etherchannel 1 port

```

Channel Group Listing

```

Group: 1
-----
Protocol :LACP

```

Ports in the Group

```

Port : Gi0/1
-----

```

```

Port State = Up in Bundle
Channel Group : 1
Mode : Active
port-channel = Po1
Pseudo port-channel = Po1
LACP port-priority = 128
LACP Wait-time = 2 secs
LACP Port Identifier = 2
LACP Activity : Active
LACP Timeout : Long

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,

Port : Gi0/2

```

-----

Port State = Up in Bundle
Channel Group : 1
Mode : Active
port-channel = Po1
Pseudo port-channel = Po1
LACP port-priority = 128
LACP Wait-time = 2 secs
LACP Activity : Active
LACP Timeout : Long

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,

Port	State	LACP Port Priority	Admin Key	Oper Key	Port Number	Port State
Gi0/1	Bundle	128	1	1	0x1	0xbc
Gi0/2	Bundle	128	1	1	0x2	0xbc

```

iss# show etherchannel 1 port-channel

```

```

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel System Identifier is 00:01:02:03:04:01

```

Channel Group Listing

```

Group : 1
-----

```

Port-channels in the group:

```

Port-channel : Po1
-----

```

```

Number of Ports = 1
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Aggregator-MAC 00:01:02:03:04:19

```

Default Port = None

```
iss# show etherchannel 1 summary
```

Flags:

D - down P - in port-channel

I - stand-alone S - suspended

H - Hot-standby (LACP only)

Port-channel is enabled

Port-channel System Identifier is 00:01:02:03:04:05

Number of channel-groups in use: 1

Number of aggregators: 1

Group	Port-channel	Protocol	Ports
1	Pol(P)	LACP	Gi0/1(P),Gi0/2(P)

```
iss# show etherchannel 1 protocol
```

Channel Group Listing

Group : 1

Protocol : LACP

```
iss# show etherchannel load-balance
```

Channel Group Listing

Group : 1

Source & Destination MAC Address

```
iss# show etherchannel redundancy
```

Actor Information for Port : Gi0/1

Channel Group : 1

Pseudo port-channel = Pol

CurrentWhile Split Interval Tmr Count = 1

Synced Partner Information for Port : Gi0/1

Partner System ID : 00:11:22:33:44:55

Flags : A

LACP Partner Port Priority : 128

LACP Partner Oper Key : 1

Port State Flags Decode

Activity : Active

LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting, Distributing,

Actor Information for Port : Gi0/2

Channel Group : 1
 Pseudo port-channel = Po1
 CurrentWhile Split Interval Tmr Count = 1

Synced Partner Information for Port : Gi0/2

Partner System ID : 00:11:22:33:44:55
 Flags : A
 LACP Partner Port Priority : 128
 LACP Partner Oper Key : 1

Port State Flags Decode

Activity : Active
 LACP Timeout : Long
 Aggregation State : Aggregation, Sync, Collecting, Distributing,



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp system-priority** - Configures the LACP priority that is associated with actor's system ID.
- **port-channel load-balance** - Configures the load balancing policy for all port channels created in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port channel.
- **interface-configuration and deletion** - Allows to configure interface such as out of band management, port channel, tunnel and so on.

19.19 show interfaces - etherchannel

This command displays Etherchannel details for all aggregated ports and port channels.

The port details contain port state, group to which the port belongs, port mode, aggregation state, port-channel ID, pseudo port-channel ID, admin key, oper key, port number, port state, and LACP port-priority, wait-time, port identifier, activity and timeout.

The port channel details contain port channel ID, number of member ports, ID of hot standby port, port state, status of protocol operate mode, aggregator MAC and default port ID.

show interfaces [<interface-type> <interface-id>] etherchannel

Syntax Description	<interface-type>	<p>- Displays the Etherchannel details for the specified type of interface. The interface can be:</p> <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
	<interface-id>	<p>- Displays the Etherchannel details for the specified interface identifier. This is a unique value that represents the specific interface.</p> <p>This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan.</p> <p>For example: 0/1 represents that the slot number is 0 and port number is 1.</p> <p>Only i-lan ID is provided, for interface type i-lan. For example: 1 represents i-lan ID.</p>

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example iss# show interfaces gigabitethernet 0/1 etherchannel

Port : Gi0/1

```

Port State = Up in Bundle
Channel Group : 2
Mode : Active
Pseudo port-channel = Po2
LACP port-priority = 128
LACP Port Identifier = 2
LACP Wait-time = 2 secs
LACP Activity : Passive
LACP Timeout : Long

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,

Port	State	LACP Port Priority	Admin Key	Oper Key	Port Number	Port State
Gi0/1	Bundle	128	2	2	0x1	0x3c

```

iss# show interfaces etherchannel

```

```

Port : Gi0/1
-----

```

```

Port State = Up in Bundle
Channel Group : 2
Mode : Active
Pseudo port-channel = Po2
LACP port-priority = 128
LACP Wait-time = 2 secs
LACP Activity : Passive
LACP Timeout : Long

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,

```

Port : Gi0/2
-----

```

```

Port State = Up in Bundle
Channel Group : 2
Mode : Active
Pseudo port-channel = Po2
LACP port-priority = 128
LACP Wait-time = 2 secs
LACP Activity : Passive
LACP Timeout : Long

```

Aggregation State : Aggregation, Sync, Collecting, Distributing,

Port	State	LACP Port Priority	Admin Key	Oper Key	Port Number	Port State
Gi0/1	Bundle	128	2	2	0x1	0x3c
Gi0/2	Bundle	128	2	2	0x2	0x3c

```

Port-channel : Po2
-----

```

```
Number of Ports = 2
HotStandBy port = null
Port state = Port-channel Ag-Inuse
Protocol = LACP
Aggregator-MAC 00:01:02:03:04:23
Default Port = None
```



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **lacp port-identifier** - Configures the LACP actor admin port ID to be filled in the LACP PDUs.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **lacp wait-time** - Configures the LACP wait-time for an interface.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port channel.

19.20 show lacp

This command displays LACP counter / neighbor information for all port-channels.

```
show lacp [<port-channel(1-65535)>] { counters | neighbor [detail] }
```

Syntax Description	port-channel	- Displays LACP counter / neighbor information for the specified port-channel. This is a unique value that represents the specific port-channel created. This value ranges from 1 to 65535.
	counters	- Displays the LACP counter information. The information contains port ID, LACPDUs sent and received, number of markers sent and received, number of marker response sent and received, number of LACPDUs packets and number of LACPDUs errors.
	neighbor [detail]	- neighbor - Displays LACP neighbor information. This information contains partner system ID, flags details, LACP partner port priority, operational key, and port state. detail - Displays detailed LACP neighbor information. This information contain partner system ID, flags, aggregation state, and LACP partner port priority, partner oper key, partner port state, activity and timeout.

Mode Privileged EXEC Mode

Example iss# show lacp 1 counters

Port	LACPDUs		Marker		Marker Response		LACPDUs	
	Sent	Recv	Sent	Recv	Sent	Recv	Pkts	Err
Channel group: 1								
Gi0/1	394	352	0	0	0	0	0	0
Gi0/2	318	297	0	0	0	0	0	0

```
iss# show lacp neighbor detail
```

```
Flags:
A - Device is in Active mode
P - Device is in Passive mode
```

```

Channel group 1 neighbors

Port Gi0/1
-----
Partner System ID           : 00:01:02:03:04:21
Flags                       : P
LACP Partner Port Priority   : 128
LACP Partner Oper Key       : 2
LACP Partner Port State     : 0x3c

Port State Flags Decode
-----
Activity : Passive
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting,
Distributing

Port Gi0/2
-----
Partner System ID           : 00:01:02:03:04:21
Flags                       : P
LACP Partner Port Priority   : 128
LACP Partner Oper Key       : 2
LACP Partner Port State     : 0x3c

Port State Flags Decode
-----
Activity : Passive
LACP Timeout : Long

Aggregation State : Aggregation, Sync, Collecting,
Distributing

```



This command can be executed successfully, only if the LA functionality is started and enabled in the switch.

Related Commands

- **shutdown port-channel** - Shuts down LA in the switch and releases the allocated resources to the switch.
- **set port-channel** - Configures the admin status of LA in the switch.
- **lacp port-priority** - Configures the LACP port priority.
- **channel-group** - Adds the port as a member of the specified port channel that is already created in the switch.
- **lacp timeout** - Configures the LACP timeout period within which LACPDUs should be received on a port to avoid timing out of the aggregated link.
- **lacp admin-key** - Configures the LACP actor admin key and LACP mode for a port.
- **default port** - Configures the port that should be set as default port for a port channel.
- **interface-configuration and deletion** - Allows to configure interface

such as out of band management, port channel, tunnel and so on.

Chapter

20

LLDP

LLDP (Link Layer Discovery Protocol) supports a set of attributes that it uses to discover the neighbor devices. These attributes contain type, length, and value descriptions and are referred to as TLVs. LLDP supported devices can use TLVs to receive and send information to their neighbors.

The switch supports these mandatory basic management TLVs.

- • Port description TLV
- • System name TLV
- • System description
- • System capabilities TLV
- • Management address TLV
- • Port VLAN ID TLV ((IEEE 802.1 organizationally specific TLVs)
- • MAC/PHY configuration/status TLV(IEEE 802.3 organizationally specific TLVs)

Interface Masters LLDP is a portable software implementation of the Link Layer Discovery Protocol (LLDP). It provides complete management capabilities using SNMP and CLI.

Interface Masters LLDP conforms to IEEE 802.1AB-2005 standard. The LLDP allows systems on an Ethernet LAN to advertise their key capabilities and also to learn about the key capabilities of other systems on the same Ethernet LAN. This, in turn, promotes a unified network management view of the LAN topology and connectivity to aid network administration and trouble-shooting.

Interface Masters LLDP provides the following features:

- Provides full conformance to the 802.1AB specification.
- Supports all mandatory TLVs (Chassis ID, Port ID and Time To Live).

- Supports optional TLVs - Port description, System name, System description, System capabilities and Management address.
- Supports organizationally specific optional TLVs - Port VLAN ID, Port and protocol VLAN ID, VLAN name, MAC or PHY configuration or status, Link Aggregation and Maximum frame size.
- Provides a generic set of APIs for easy integration into different platforms.
- Supports the basic MIB, as well as, the extension MIBs in Appendix F and Appendix G, defined in the 802.1AB specification and a proprietary MIB for management.
- Provides support for configuration and management by providing generic APIs usable from different management schemes like SNMP, CLI.
- Provides support for notifications through Traps.
- Conforms to Flexible Software Architecture for Portability (FSAP2), thus ensuring portable code, which uses flexible buffer and timer management libraries.

The list of CLI commands for the configuration of LLDP is as follows:

- shutdown lldp
- set lldp
- lldp transmit-interval
- lldp holdtime-multiplier
- lldp reinitialization-delay
- lldp tx-delay
- lldp notification-interval
- lldp chassis-id-subtype
- clear lldp counters
- clear lldp table
- lldp transmit / receive
- lldp notification
- lldp tlv-select basic-tlv
- lldp port-id-subtype
- lldp tlv-select dot1tlv
- lldp tlv-select dot3tlv
- debug lldp
- show lldp
- show lldp interface
- show lldp neighbors
- show lldp traffic
- show lldp local

- show lldp errors
- show lldp statistics

20.1 shutdown lldp

This command shuts down all the ports in the LLDP and releases all the allocated memory. The no form of the command enables all the ports by allocating the required resources in the LLDP

shutdown lldp

no shutdown lldp

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default LLDP is not shutdown in the system

Example `iss(config)# shutdown lldp`



LLDP cannot be started in the switch, if the base bridge mode is configured as transparent bridging.

Related Commands:

- **base bridge-mode** - Configures the mode in which the VLAN feature should operate on the switch.
- **set lldp** - Transmits or receives LLDP frames from the server to the LLDP module
- **lldp transmit / receive** - Transmits or receives LLDP frames from the one of the ports of the server to the LLDP module.
- **lldp tlv-select basic-tlv** - Enables the basic settings while transmitting the LLDP frames on a given port.
- **lldp tlv-select dot1tlv** - Configures dot1 TLV while transmitting the LLDP frames to the particular port
- **lldp tlv-select dot3tlv** - Configures dot3 TLV while transmitting the LLDP frames to the particular port
- **lldp transmit-interval** - Sets the transmission time interval in which the server sends the LLDP frames to the LLDP module.
- **lldp holdtime-multiplier** - Sets the holdtime-multiplier value, which is the amount of time, the server should hold the LLDP
- **lldp reinitialization-delay** - Sets the reinitialization delay time which is the minimum time an LLDP port will wait before reinitializing LLDP transmission.
- **lldp tx-delay** - Sets the transmit delay which is the minimum amount of delay between successive LLDP PDUs.
- **lldp notification** - Controls the transmission of LLDP notifications.
- **lldp notification-interval** - Sets the notification interval which is the

minimum interval to generate a notification-event about a change in local system.

- **lldp chassis-id-subtype** - Configures an ID for LLDP chassis subtype which is a unique address of any module.
- **lldp port-id-subtype** - Configures an ID for LLDP port subtype
- **clear lldp counters** - Clears the inbuilt counter which has the total count of LLDP frames transmitted/received..
- **clear lldp table** - Clears all the LLDP information about the neighbors.
- **debug lldp** - Specifies debug level for LLDP module.
- **show lldp** - Displays the LLDP global configuration details to initialize on an interface.
- **show lldp interface** - Displays the information about interfaces where LLDP is enabled .
- **show lldp neighbors** - Displays information about neighbors on an interface or all interfaces.
- **show lldp traffic** - Displays LLDP counters on all interfaces or on a specific interface
- **show lldp local** - Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.
- **show lldp errors** - Displays the information about the errors such as memory allocation failures, queue overflows and table overflow
- **show lldp statistics** - Displays the LLDP remote table statistics information.

20.2 set lldp

This command transmits or receives LLDP frames from the server to the LLDP module.

```
set lldp {enable | disable}
```

Syntax Description	Enable	- Transmits/receives the LLDP packets between LLDP module and the server.
	disable	- Does not transmit/receive the LLDP packets between LLDP module and the server.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default Disable

Example `iss(config)# set lldp enable`



This command can be executed only if lldp is not shutdown.

Related Commands	• no shutdown lldp – Starts all the ports in the LLDP and releases all the allocated memory.
	• show lldp – Displays LLDP global configuration details
	• show lldp interface – Displays the information about interfaces where LLDP is enabled .
	• show lldp neighbors – Displays information about the neighbors on an interface or all interfaces.
	• show lldp traffic – Displays LLDP counters on all interfaces or on a specific interface
	• show lldp errors – Displays the information about the errors such as memory allocation failures, queue overflows and table overflow.
	• show lldp statistics – Displays the LLDP remote table statistics information.

20.3 lldp transmit-interval

This command sets the transmission interval in which the server sends the LLDP frames to the LLDP module. The no form of the command sets the transmission interval to the default value. The value ranges between 5 and 32768 seconds.

```
lldp transmit-interval <seconds (5-32768)>
```

```
no lldp transmit-interval
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default 30 seconds

Example `iss(config)# lldp transmit-interval 50`



This command is executable only if lldp is not shutdown.

**Related
Commands**

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **show lldp** – Displays LLDP global configuration details

20.4 lldp holdtime-multiplier

This command sets the holdtime-multiplier value, which is the amount of time, the server should hold the LLDP. The no form of the command sets the multiplier to the default value. The value ranges between 2 and 10 seconds.

TLV (Time to Live) A value that tells the receiving agent, how long the information contained in the TLV Value field is valid.

$TTL = \text{message transmission interval} * \text{hold time multiplier}$.

For example, if the value of LLDP transmission interval is 30, and the value of the LLDP hold multiplier is 4, then the value 120 is encoded in the TTL field in the LLDP header.

```
lldp holdtime-multiplier <value(2-10)>
```

```
no lldp holdtime-multiplier
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default 4

Example `iss(config)# lldp holdtime-multiplier 5`



This command is executable only if lldp is not shutdown.

Related Commands

- `no shutdown lldp` – Starts all the ports in the LLDP and releases all the allocated memory.
- `show lldp` – Displays LLDP global configuration details.
- `lldp tx-delay` – Sets transmit delay which is the minimum amount of delay between successive LLDP frame transmissions.

20.5 lldp reinitialization-delay

This command sets the reinitialization delay time which is the minimum time an LLDP port will wait before reinitializing LLDP transmission. The no form of the command sets the reinitialization delay time to the default value. The value ranges between 1 and 10 seconds.

```
lldp reinitialization-delay <seconds (1-10)>
```

```
no lldp reinitialization-delay
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default 2 seconds

Example `iss(config)# lldp reinitialization-delay 4`



This command is executable only if lldp is not shutdown.

Related Commands

- `no shutdown lldp` – Starts all the ports in the LLDP and releases all the allocated memory.
- `show lldp` – Displays LLDP global configuration details

20.6 lldp tx-delay

This command sets the transmit delay which is the minimum amount of delay between successive LLDP frame transmissions. The no form of the command sets the transmit delay to the default value. The value ranges between 1 and 8192 seconds.



TxDelay should be less than or equal to $(0.25 * \text{Message Tx Interval})$

```
lldp tx-delay <seconds (1-8192)>
```

```
no lldp tx-delay
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default 2 seconds

Example iss(config)# lldp tx-delay 120



This command is executable only if lldp is not shutdown.

Related Commands

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **show lldp** - Displays LLDP global configuration details
- **lldp holdtime-multiplier** – Sets the holdtime-multiplier value, which is the amount of time, the server should hold the LLDP.

20.7 lldp notification-interval

This command sets the time interval in which the local system generates a notification-event. In the specific interval, generating more than one notification-event is not possible. The value ranges between 5 and 3600 seconds. The no form of the command sets the notification interval to the default value.

```
lldp notification-interval <seconds (5-3600)>
```

```
no lldp notification-interval
```

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Default 5 seconds

Example iss(config)# lldp notification-interval 150



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **show lldp** – Displays LLDP global configuration details
- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.8 lldp chassis-id-subtype

This command configures an ID for LLDP chassis subtype which is a unique address of any module.



Chassis id value can be set only for the chassis-component and local system subtypes. For all other subtypes, it takes the value from the system automatically.

```
lldp chassis-id-subtype { chassis-comp <string(255)> | if-alias | port-comp
<string(255)> | mac-addr | nw-addr | if-name | local <string(255)> }
```

Syntax Description	chassis-comp	- Represents a chassis identifier based on the value of entPhysicalAlias object for a chassis component
	if-alias	- Represents a chassis identifier based on the value of ifAlias for an interface on the containing chassis.
	port-comp	- Represents a chassis identifier based on the value of entPhysicalAlias object for a port or backplane within the chassis.
	mac-addr	- Represents a chassis identifier based on the value of a unicast source address, of a port on the chassis.
	nw-addr	- Represents a chassis identifier based on a network address, associated with a particular chassis. The encoded address is actually composed of two fields. The first field is a single octet, representing the IANA AddressFamilyNumbers value for the specific address type, and the second field is the network address value.
	if-name	- Represents a chassis identifier based on the value of ifName object for an interface on the containing chassis.
	local	- Represents a chassis identifier based on a locally defined value."
Mode	Global Configuration Mode	
Package	Workgroup, Enterprise and Metro	
Default	mac-addr	
Example	iss(config)# lldp chassis-id-subtype chassis-comp Interface Mastersswitch	
	iss(config)# lldp chassis-id-subtype if-alias	



This command is executable only if lldp is not shutdown..

**Related
Commands**

- **show lldp** – Displays LLDP global configuration details
- **show lldp local** – Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.
- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.9 clear lldp counters

This command clears the inbuilt counter which has the total count of LLDP frames that are transmitted/received.



This command does not clear the global statistics.

clear lldp counters

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)# clear lldp counters`



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **show lldp traffic** – Displays the LLDP counters on all interfaces or on a specific interface
- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.10 clear lldp table

This command clears all the LLDP information about the neighbors.

clear lldp table

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)# clear lldp table`



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **show lldp neighbors** – Displays information about the neighbors on an interface or all interfaces.
- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.11 lldp transmit / receive

This command transmits or receives LLDP frames from the one of the ports of the server to the LLDP module. The no form of the command resets LLDP admin status on an interface.

```
lldp {transmit | receive}
```

```
no lldp {transmit | receive}
```

Syntax Description	transmit	-	Enables transmission of LLDPDU from one of the ports of the server to the LLDP module.
	receive	-	Enables reception of LLDPDU from one of the ports of the server to the LLDP module.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Default Transmission and Reception are enabled

Example `iss(config-if)# lldp transmit`



This command can be executed only if lldp is not shutdown.

Related Commands

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **show lldp interface** – Displays LLDP configuration details on a particular interface or all interfaces
- **show lldp statistics** – Displays the LLDP remote table statistics information.

20.12 lldp notification

This command controls the transmission of LLDP notifications. The no form of the command disables LLDP trap notification on an interface.

```
lldp notification [remote-table-chg] [mis-configuration]
```

```
no lldp notification
```

Syntax Description	remote-table-chg	- Sends trap notification to NMS whenever remote table change occurs.
	mis-configuration	- Sends trap notification to NMS whenever misconfiguration is identified.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Default mis-configuration

Example `iss(config-if)# lldp notification remote-table-chg`



This command can be executed only if lldp is not shutdown.

- Related Commands**
- **show lldp interface** - Displays LLDP configuration details on a particular interface or all interfaces
 - **no shutdown lldp** - Starts all the ports in the LLDP and releases all the allocated memory.

20.13 lldp tlv-select basic-tlv

This command enables the basic settings while transmitting the LLDP frames on a given port. The no form of the command disables the basic TLV transmission on a given port.

```
lldp tlv-select basic-tlv { [port-descr] [sys-name] [sys-descr] [sys-capab]
[mgmt-addr {all | ipv4 <ucast_addr> | ipv6 <ip6_addr>}] }
```

```
no lldp tlv-select basic-tlv { [port-descr] [sys-name] [sys-descr] [sys-capab]
[mgmt-addr {all | ipv4 <ucast_addr> | ipv6 <ip6_addr>}] }
```

Syntax Description	port-descr	-	Configures the port, which is a combination of interface type and interface ID. The interface ID is a combination of slot number and the port number (slot number/port number).
	sys-name	-	Configures the system name of the TLV
	sys-descr	-	Configures the system description of the TLV
	sys-capab	-	Configures the system capabilities of the TLV
	mgmt-addr all	-	Enables the transmission of all the available management address on the current interface. If no management address is present/configured in the system, switch mac-address will be taken for transmission.
	mgmt-addr ipv4 <ip addr>	-	Enables the transmission of a particular ipv4 address on the current interface.
	mgmt-addr ipv6 <ip addr>	-	Enables the transmission of a particular ipv6 address on the current interface.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Example iss(config-if)# lldp tlv-select basic-tlv port-descr mgmt-addr all



This command can be executed only if lldp is not shutdown.

Related

- no shutdown lldp** – Starts all the ports in the LLDP and releases all the

Commands

allocated memory.

- **show lldp neighbors** - Displays information about the neighbors on an interface or all interfaces.
- **show lldp local** - Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces
- **show lldp errors** - Displays the information about the errors such as memory allocation failures, queue overflows and table overflow.

20.14 lldp port-id-subtype

This command configures an ID for LLDP port subtype

```
lldp port-id-subtype { if-alias | port-comp <string(255)> | mac-addr | if-name
| local <string(255)> }
```

Syntax Description

if-alias	-	Represents a chassis identifier based on the value of ifAlias for an interface on the containing chassis.
port-comp	-	Represents a chassis identifier based on the value of entPhysicalAlias object for a port or backplane within the chassis.
mac-addr	-	Represents a chassis identifier based on the value of a unicast source address, of a port on the containing chassis.
if-name	-	Represents a chassis identifier based on the value of ifName object for an interface on the containing chassis.
local	-	Represents a chassis identifier based on a locally defined value."

Mode

Interface Configuration Mode

Package

Workgroup, Enterprise and Metro

Default

if-alias

Example

```
iss(config-if)# lldp port-id-subtype mac-addr
iss(config-if)# lldp port-id-subtype local slot0/1
```



This command can be executed only if lldp is not shutdown.

Related Commands

- **show lldp local** – Displays the current switch information that will be used to populate the outbound LLDP advertisements for a specific interface or all interfaces
- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.15 lldp tlv-select dot1tlv

This command performs dot1 TLV configuration while transmitting the LLDP frames to the particular port apart from the basic settings. The no form of the command disables the transmission of dot1 TLV types on a port.

```
lldp tlv-select dot1tlv {[port-vlan-id] [protocol-vlan-id {all | <vlan-id>}]
[vlan-name {all | <vlan-id>}]}
```

```
no lldp tlv-select dot1tlv {[port-vlan-id] [protocol-vlan-id {all | <vlan-id>}]
[vlan-name {all | <vlan-id>}]}
```

Syntax Description	port-vlan-id	-	Specifies the VLAN ID of the port that uniquely identifies a specific VLAN. This VLAN ID is associated with a specific group of protocols for the specific port.
	protocol-vlan-id	-	Specifies the protocol ID that represents a specific group of protocols that are associated together when assigning a VID to a frame. This group ID is associated with the specific port.
	vlan-name	-	Specifies the administratively assigned string, which is used to identify the VLAN.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-if)# lldp tlv-select dot1tlv port-vlan-id
protocol-vlan-id 42
```



This command can be executed only if lldp is not shutdown.

Related Commands


- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **show lldp neighbors** - Displays information about the neighbors on an interface or all interfaces.
- **show lldp local** – Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces
- **show lldp errors** – Displays the information about the errors such as memory allocation failures, queue overflows and table overflow.

20.16 lldp tlv-select dot3tlv

This command performs dot3 TLV configuration while transmitting the LLDP frames to the particular port apart from the basic settings. The no form of the command disables the transmission of dot3 TLV types on a port.

```
lldp tlv-select dot3tlv { [macphy-config] [link-aggregation] [max-framesize] }
```

```
no lldp tlv-select dot3TLV { [macphy-config] [link-aggregation] [max-framesize] }
```

Syntax Description	macphy-config	-	Configures the physical MAC address of the TLV.
	link-aggregation	-	Configures the link aggregation protocol statistics for each port on the device.
	max-framesize	-	Configures the maximum frame size of the TLV.
Mode	Interface Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Example	iss(config-if)# lldp tlv-select dot3tlv macphy-config		
	 This command can be executed only if lldp is not shutdown.		
Related Commands	<ul style="list-style-type: none"> • no shutdown lldp – Starts all the ports in the LLDP and releases all the allocated memory. • show lldp neighbors - Displays information about the neighbors on an interface or all interfaces. • show lldp local – Displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces • show lldp errors – Displays the information about the errors such as memory allocation failures, queue overflows and table overflow. 		

20.17 debug lldp

This command specifies debug level for LLDP module.. The no form of the command disables debug option for LLDP module.

```
debug lldp [{all | [init-shut] [mgmt] [data-path] [ctrl] [pkt-dump] [resource]
[all-fail] [buf] [neigh-add] [neigh-del] [neigh-updt] [neigh-drop] [neigh-
ageout] [critical][tlv {all | [chassis-id][port-id] [ttl] [port-descr] [sys-
name] [sys-descr] [sys-capab] [mgmt-addr] [port-vlan] [ppvlan] [vlan-name]
[proto-id] [mac-phy] [pwr-mdi] [lagg] [max-frame]}}] [redundancy]]]
```

```
no debug lldp [{all | [init-shut] [mgmt] [data-path] [ctrl] [pkt-dump]
[resource] [all-fail] [buf] [neigh-add] [neigh-del] [neigh-updt] [neigh-drop]
[neigh-ageout] [critical][tlv {all | [chassis-id][port-id] [ttl] [port-descr]
[sys-name] [sys-descr] [sys-capab] [mgmt-addr] [port-vlan] [ppvlan] [vlan-
name] [proto-id] [mac-phy] [pwr-mdi] [lagg] [max-frame]}}] [redundancy]]]
```

Syntax Description	all	- Generates debug statements for all traces
	init-shut	- Generates debug statements for init and shutdown traces. This trace is generated on failed initialization and shutting down of LLDP related entries.
	mgmt	- Generates debug statements for management traces. This trace is generated during failure in configuration of any of the LLDP features.
	data-path	- Generates debug statements for data path traces. This trace is generated during failure in packet processing.
	ctrl	- Generates debug statements for control path traces. This trace is generated during failure in modification or retrieving of LLDP entries
	pkt-dump	- Generates debug statements for packet dump traces. This trace is currently not used in LLDP module.
	resource	- Generates debug statements for OS resource related traces. This trace is generated during failure in message queues.
	all-fail	- Generates debug statements for all failure traces of the above mentioned traces
	buf	- Generates debug statements for LLDP buffer related traces. This trace is currently not used in LLDP

module.

neigh-add	-	Generates debug statements for add SEM.
neigh-del	-	Generates debug statements for delete SEM.
neigh-updt	-	Generates debug statements for update SEM.
neigh-drop	-	Generates debug statements for drop SEM.
neigh-ageout	-	Generates debug statements for ageout SEM.
critical	-	Generates debug statements for critical SEM.
tlv all	-	Generates debug statements for all TLV traces
tlv chassis-id	-	Generates debug statements for chassis-id TLV traces
tlv port-id	-	Generates debug statements for port-id TLV trace
tlv ttl	-	Generates debug statements for TTL TLV trace
tlv port-descr	-	Generates debug statements for the port description TLV traces
tlv sys-name	-	Generates debug statements for the system name TLV traces
tlv sys-descr	-	Generates debug statements for system description TLV traces
tlv sys-capab	-	Generates debug statements for system capabilities TLV traces
tlv mgmt-addr	-	Generates debug statements for management address TLV traces
tlv port-vlan	-	Generates debug statements for port-vlan TLV traces
tlv ppvlan	-	Generates debug statements for port-protocol-vlan TLV traces
tlv vlan-name	-	Generates debug statements for vlan-name TLV traces

tlv proto-id	-	Generates debug statements for protocol-id TLV traces
tlv mac-phy	-	Generates debug statements for MAC or PHY TLV traces
tlv pwr-mdi	-	Generates debug statements for power-through-MDI TLV traces
tlv lagg	-	Generates debug statements for link aggregation TLV traces
tlv max-frame	-	Generates debug statements for maximum frame size TLV traces
redundancy	-	Generates the debug statements for the LLDP redundancy module.

Mode Privileged Exec Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# debug lldp init-shut mgmt
iss# debug lldp tlv sys-descr lagg
iss# debug lldp
```



This command can be executed only if lldp is not shutdown.

Related Commands:

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.

20.18 show lldp

This command displays LLDP global configuration details to initialize on an interface.

show lldp

Mode Privileged EXEC Mode

Example iss# show lldp

```
LLDP is enabled
Transmit Interval      : 30
Holdtime Multiplier    : 4
Reinitialization Delay : 2
Tx Delay               : 2
Notification Interval  : 5
Chassis Id SubType     : Mac Address
Chassis Id             : 00:02:02:03:04:01
```



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **set lldp** - Enables or disables LLDP on the system.
- **lldp transmit-interval** - Sets the transmission interval
- **lldp holdtime-multiplier** - Sets the multiplier value
- **lldp reinitialization-delay** - Sets the reinitialization delay
- **lldp tx-delay** - Sets the transmit delay
- **lldp notification-interval** - Sets the notification interval
- **lldp chassis-id-subtype** - Configures lldp chassis id subtype and chassis id value
- **no shutdown lldp** - Starts all the ports in the LLDP and releases all the allocated memory.

20.19 show lldp interface

This command displays the information about interfaces where LLDP is enabled .

show lldp interface [<interface-type> <interface-id>]

Syntax Description	interface-type	- Displays the information about the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. • port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.
	interface-id	- Displays the information about the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
Mode	Privileged EXEC Mode	
Package	Workgroup, Enterprise and Metro	
Example	<pre>iss# show lldp interface gigabitethernet 0/1 Gi0/1: Tx State : Enabled Rx State : Enabled Tx SEM State : IDLE Rx SEM State : WAIT FOR FRAME Notification Status : Disabled Notification Type : Mis-configuration</pre>	



This command can be executed only if lldp is not shutdown.

Related Commands

- **set lldp** - Enables or disables LLDP on the system
- **lldp transmit / receive** - Sets LLDP admin status on an interface to Transmit or Receive
- **lldp notification** - Enables LLDP trap notification on an interface
- **no shutdown lldp** - Starts all the ports in the LLDP and releases all the allocated memory.

20.20 show lldp neighbors

This command displays information about neighbors on an interface or all interfaces.

```
show lldp neighbors [chassis-id <string(255)> port-id <string(255)>]
[<interface-type> <interface-id>][detail]
```

Syntax Description	chassis-id	- Configures the chassis identifier string.
	port-id	- Configures the port number that represents the concerned aggregation port
	interface-type	- Displays information about neighbors for the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. • port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.
	interface-id	- Displays information about neighbors for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
	detail	- Displays the information obtained from all the received TLVs .
Mode	Privileged EXEC Mode	

Package Workgroup, Enterprise and Metro

Example iss# show lldp neighbors

```

Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Chassis ID          Local Intf   Hold-time   Capability   Port Id
-----
00:01:02:03:04:01  Gi0/1         120         B,R         Slot0/1
00:02:02:03:04:01  Gi0/2         120                     Slot0/3
00:02:02:03:04:01  Gi0/3         120                     Slot0/2
00:01:02:03:04:01  Gi0/2         120                     Slot0/2
00:01:02:03:04:01  Gi0/3         120                     Slot0/2

Total Entries Displayed : 5

```

```

iss# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id
Slot0/2

```

```

Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Chassis ID          Local Intf   Hold-time   Capability   Port
Id
-----
-
00:01:02:03:04:01  Gi0/2         120
Slot0/2
00:01:02:03:04:01  Gi0/3         120
Slot0/2

Total Entries Displayed : 2

```

```

iss# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id
Slot0/2 gigabitethernet 0/2

```

```

Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Chassis ID          Local Intf   Hold-time   Capability   Port
Id
-----
-
00:01:02:03:04:01  Gi0/2         120
Slot0/2

Total Entries Displayed : 1

```

```
iss# show lldp neighbors chassis-id 00:01:02:03:04:01 port-id
Slot0/2 detail
```

```
Capability Codes      :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
```

```
Chassis Id SubType      : Mac Address
Chassis Id              : 00:01:02:03:04:01
Port Id SubType         : Interface Alias
Port Id                 : Slot0/2
Port Description        : Not Advertised
System Name             : Not Advertised
System Desc             : Not Advertised
Local Intf              : Gi0/2
Time Remaining          : 92 Seconds
System Capabilities Tlv : Not Advertised
Management Addresses    : Not Advertised
```

```
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto Negotiation Tlv      : Not Advertised
-Link Aggregation
Link Aggregation Tlv      : Not Advertised
-Maximum Frame Size Tlv   : Not Advertised
```

```
Extended 802.1 TLV Info
-Port VLAN Id             : 0
-Port & Protocol VLAN Id
Protocol Vlan Tlv         : Not Advertised
-Vlan Name
Vlan Id      Vlan Name
-----
```

```
-----
Chassis Id SubType      : Mac Address
Chassis Id              : 00:01:02:03:04:01
Port Id SubType         : Interface Alias
Port Id                 : Slot0/2
Port Description        : Not Advertised
System Name             : Not Advertised
System Desc             : Not Advertised
Local Intf              : Gi0/3
Time Remaining          : 92 Seconds
System Capabilities Tlv : Not Advertised
Management Addresses    : Not Advertised
```

```
Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto Negotiation Tlv      : Not Advertised
-Link Aggregation
Link Aggregation Tlv      : Not Advertised
-Maximum Frame Size Tlv   : Not Advertised
```

```
Extended 802.1 TLV Info
-Port VLAN Id             : 0
-Port & Protocol VLAN Id
Protocol Vlan Tlv         : Not Advertised
```

```

-Vlan Name
Vlan Id      Vlan Name
-----
-----

Total Entries Displayed : 2

iss# show lldp neighbors gigabitethernet 0/1 detail

Capability Codes   :
(R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device,
(W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Chassis Id SubType      : Mac Address
Chassis Id              : 00:01:02:03:04:01
Port Id SubType         : Interface Alias
Port Id                 : Slot0/1
Port Description        : Ethernet Interface
System Name             : Interface Masters Linux Router
Ver 1.0
System Desc            : SNMPV2
Local Intf              : Gi0/1
Time Remaining         : 95 Seconds
System Capabilities Supported : B,R
System Capabilities Enabled   : B,R
Management Addresses    :
IfId SubType Address          OID
-----
33   IPv4      12.0.0.1       1 3 6 1 2 1 2 2 1 1

Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto-Neg Support & Status : Supported, Disabled
Advertised Capability Bits : 8000
Other
-Link Aggregation
Capability & Status       : Not Capable, Not In Aggregation
Aggregated Port Id       : 1
-Maximum Frame Size      : 1500

Extended 802.1 TLV Info
-Port VLAN Id            : 1
-Port & Protocol VLAN Id
Protocol Vlan Id         Support      Status
-----
1                         Supported   Enabled
2                         Supported   Enabled
30                        Supported   Enabled
-Vlan Name
Vlan Id      Vlan Name
-----
1            vlan1
2            vlan2
30           vlan30
-----

```

Total Entries Displayed : 1



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **set lldp** - Enables or disables LLDP on the system
- **clear lldp table** – Clears all the LLDP table of information about the neighbors.
- **lldp tlv-select basic-tlv** – Configures basic TLV types to be transmitted on a given port
- **lldp tlv-select dot1tlv** – Configures dot1 TLV types to be transmitted on a port
- **lldp tlv-select dot3tlv** - Configures dot3 TLV types to be transmitted on a port

20.21 show lldp traffic

This command displays LLDP counters on all interfaces or on a specific interface. This includes the following:

- Total Frames Out
- Total Entries Aged
- Total Frames In
- Total Frames Received In Error
- Total Frames Discarded
- Total TLVS Unrecognized
- Total TLVs Discarded

show lldp traffic [<iftype> <ifnum>]

Syntax Description

iftype

- Displays the LLDP counters for specified type of interface. The interface can be:
 - fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
 - gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second.
 - extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
 - i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap.
 - port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.

ifnum

- Displays the LLDP counters for specified interface identifier. This is a unique value that represents the specific interface.
 This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.
 For example: 0/1 represents that the slot number is 0 and port number is 1.
 Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show lldp traffic
Total Frames Out           : 107
Total Entries Aged         : 0
Total Frames In            : 159
Total Frames Received In Error : 0
Total Frames Discarded     : 0
Total TLVS Unrecognized    : 0
Total TLVs Discarded       : 0

iss# show lldp traffic gigabitethernet 0/1
Total Frames Out           : 49
Total Entries Aged         : 0
Total Frames In            : 42
Total Frames Received In Error : 0
Total Frames Discarded     : 0
Total TLVS Unrecognized    : 0
Total TLVs Discarded       : 0
```



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **set lldp** - Enables or disables LLDP on the system
- **clear lldp counters** – Clears the entire interface related transmit and receive counters.

20.22 show lldp local

This command displays the current switch information that will be used to populate outbound LLDP advertisements for a specific interface or all interfaces.

```
show lldp local {[<interface-type> <interface-id>] | [mgmt-addr]}
```

Syntax Description	interface-type	- Displays the current switch information for the specified type of interface. The interface can be: <ul style="list-style-type: none"> fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. port-channel – Logical interface that represents an aggregator which contains several ports aggregated together
	interface-id	- Displays the current switch information for the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.
	mgmt-addr	- All the management addresses configured in the system and Tx enabled ports

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show lldp local gigabitethernet 0/1
Port Id SubType           : Interface Alias
Port Id                   : Slot0/1
```

```

Port Description           : Ethernet Interface
Enabled Tx Tlvs           : Port Description, System Name,
                           System Description, System
                           Capability,
                           Management Address, Port Vlan,
Mac Phy,
                           Link Aggregation, Max Frame
Size

Extended 802.3 TLV Info
-MAC PHY Configuration & Status
Auto-Neg Support & Status : Supported, Disabled
Advertised Capability Bits : 8000
Other
Operational MAU Type      : 0
-Link Aggregation
Capability & Status       : Not Capable, Not In Aggregation
Aggregated Port Id        : 1
-Maximum Frame Size      : 1500

Extended 802.1 TLV Info
-Port VLAN Id             : 1
-Port & Protocol VLAN Id
Protocol VLAN Id          Support   Protocol VLAN Status
TxStatus
-----
--
1                          Supported Enabled
Enabled
2                          Supported Enabled
Enabled
30                         Supported Enabled
Enabled
-Vlan Name
Vlan Id                   Vlan Name                               TxStatus
-----
1                          vlan1                               Enabled
2                          vlan2                               Enabled
30                         vlan3                               Enabled
-----

```

```

iss# show lldp local mgmt-addr
Management Address      TxEnabledPorts
-----
13.0.0.1                Gi0/1
15.0.0.1                Gi0/1

```



This command can be executed only if lldp is not shutdown.

Related Commands

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **set lldp** - Enables or disables LLDP on the system
- **lldp chassis-id-subtype** - Configures lldp chassis id subtype and chassis

id value

- **lldp port-id-subtype** - Configures lldp port id subtype and port id value for a given port
- **lldp tlv-select basic-tlv** – Configures basic TLV types to be transmitted on a given port
- **lldp tlv-select dot1tlv** – Configures dot1 TLV types to be transmitted on a port
- **lldp tlv-select dot3tlv** - Configures dot3 TLV types to be transmitted on a port

20.23 show lldp errors

This command displays the information about the errors such as memory allocation failures, queue overflows and table overflow.

show lldp errors

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show lldp errors
Total Memory Allocation Failures : 0
Total Input Queue Overflows      : 0
Total Table Overflows            : 0
```



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **no shutdown lldp** – Starts all the ports in the LLDP and releases all the allocated memory.
- **set lldp** - Enables or disables LLDP on the system
- **lldp tlv-select basic-tlv** – Configures basic TLV types to be transmitted on a given port
- **lldp tlv-select dot1tlv** – Configures dot1 TLV types to be transmitted on a port
- **lldp tlv-select dot3tlv** - Configures dot3 TLV types to be transmitted on a port

20.24 show lldp statistics

This command displays the LLDP remote table statistics information.

show lldp statistics

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show lldp statistics
Remote Table Last Change Time : 100300
Remote Table Inserts           : 5
Remote Table Deletes           : 0
Remote Table Drops             : 0
Remote Table Ageouts           : 0
Remote Table Updates           : 4
```



This command can be executed only if lldp is not shutdown.

**Related
Commands**

- **set lldp** - Enables or disables LLDP on the system
- **lldp transmit / receive** - Sets LLDP admin status on an interface to transmit / receive
- **no shutdown lldp** - Starts all the ports in the LLDP and releases all the allocated memory.

Chapter

21

PNAC

PNAC (Port Based Network Access Control) is a portable implementation of the IEEE Std 802.1x PNAC. It can be used in both LAN Switches and Wireless LAN Access Points for providing security services. When used in LAN Switches, it offers access control to protected resources existing in the switched network. When used in WLAN Access Points, it not only provides authentication of the WLAN stations, but also improves the security by making use of the periodically exchanged key for encrypting the data. PNAC can be very easily ported to different RTOS environments and interfaced to different switch hardware.

The list of CLI commands for the configuration of PNAC is as follows:

- `aaa authentication dot1x default`
- `dot1x local-database`
- `set nas-id`
- `dot1x system-auth-control`
- `shutdown dot1x`
- `dot1x init-session`
- `dot1x init session-reauth`
- `dot1x default`
- `dot1x max-req`
- `dot1x max-start`
- `dot1x reauthentication`
- `dot1x timeout`

ISS

- dot1x port-control
- dot1x access-control
- dot1x control-direction
- dot1x auth-mode
- dot1x host-mode
- dot1x re-authenticate
- dot1x initialize
- debug dot1x
- show dot1x

21.1 aaa authentication dot1x default

This command enables the dot1x local authentication or RADIUS server or TACACS PLUS server based remote authentication method for all ports. The actual authentication of the supplicant happens at the authentication server.

The no form of the command disables dot1x in the switch.

```
aaa authentication dot1x default { group {radius | tacacsplus | tacacs+} | local}
```

```
no aaa authentication dot1x default
```

Syntax Description	radius	- Configures Radius as the authentication server. Radius offers Authentication, Authorization and Accounting management for computers to access a network.
	tacacsplus	- Configures TACACS PLUS as the authentication server. Tacacs offers Authentication, Authorization and Accounting management for computers to access a network.
	tacacs+	- TACACS+ server based authentication. This feature has been included to adhere to the Industry Standard CLI syntax.
	local	- Configures Local authentication as the authentication mode. It provides authentication based on usernames and password using EAP-MD5 authentication mechanism.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults local

Example iss(config)# aaa authentication dot1x default group radius

- Related Commands**
- **radius-server host** - Specifies RADIUS query parameters
 - **dot1x local-database** - Configures the dot1x authentication server database with user name and password
 - **show dot1x** - Displays dot1x detailed information

21.2 dot1x local-database

This command configures dot1x authentication server local database with user name and password. The no form of the command deletes an entry from the dot1x authentication server database.

```
dot1x local-database <username> password <password> permission {allow | deny}
[<auth-timeout (value(1-7200))>] [interface <interface-type> <interface-list>]
```

```
no dot1x local-database <username>
```

Syntax Description

- | | |
|---|--|
| <username> | - Configures the User name for the new entry in the database. |
| password<password> | - Configures the Password for the new entry in the database. |
| Permission | - Configures the permission for access for the user on a set of ports.
The options are <ul style="list-style-type: none"> • Allow- Provides access to the user • Deny- Denies access to the user. |
| <auth-timeout (value(1-7200))> | - Configures the time in seconds after which the authentication allowed to the user expires. Maximum value is 7200 seconds. When the timeout value is 0, the authenticator uses the re-authentication period of the authenticator port. |
| <interface-type> | - Configures the interface type for the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap. • port-channel – Logical interface that represents an aggregator which contains several ports aggregated |

together.

- <interface-list>**
- Configures the interface list for the specified interface identifier. This is a unique value that represents the specific interface.
This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.
For example: 0/1 represents that the slot number is 0 and port number is 1.
Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

permission	- allow
interface-list	- all the physical interfaces

Example

```
iss(config)# dot1x local-database Interface Masters password  
admin123 permission allow auth-timeout 6000
```

- Related Commands**
- **aaa authentication dot1x default** - Enables the dot1x local authentication
 - **show dot1x** - Displays dot1x local database information

21.3 set nas-id

This command sets the dot1x network access server id. Network Access Server Identifier is set in the RADIUS packets sent to the Remote Authentication Server Maximum length of the string is 16.

set nas-id <identifier>

Syntax **<identifier>** - Configures the network access server identifier
Description
n

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults fsNas1

Example `iss(config)#set nas-id Identifier`



NAS id can be configured only if the remote authentication server is Radius or Tacacs

Related Command • **show dot1x** - Displays dot1x information

21.4 dot1x system-auth-control

This command enables dot1x in the switch. The dot1x is an authentication mechanism. It acts as mediator between the authentication server and the supplicant(client). If the client accesses the protected resources, it contacts the authenticator with EAPOL frames. The no form of this command disables dot1x in the switch.

dot1x system-auth-control

no dot1x system-auth-control

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults dot1x is enabled

Example `iss(config)# dot1x system-auth-control`

Related Commands

- **shutdown dot1x** - Shuts down dot1x capability
- **show dot1x** - Displays dot1x information

21.5 shutdown dot1x

This command shuts down dot1x feature. By shutting down the dot1x feature, the supplicant-authenticator-authentication server architecture is dissolved. The data transport and authentication are directly governed by the authentication server/server. When shutdown, all resources acquired by dot1x module are released to the system. The no form of the command starts and enables dot1x

shutdown dot1x

no shutdown dot1x

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)# shutdown dot1x`

Related Commands

- **dot1x system-auth-control** - Enables dot1x in the switch
- **show dot1x** - Displays dot1x information
- **base bridge-mode** - Configures the mode in which the VLAN feature should operate on the switch.

21.6 dot1x init-session

This command initiates dot1x authentication session for the given MAC address of the supplicant. The supplicant requests for access to the protected network. It sends EAPOL frames to the authenticator. When the supplicant is authorized by the remote server, the session is initiated.

```
dot1x init-session <supp addr - aa.aa.aa.aa.aa.aa>
```

Syntax	<code><supp addr - aa.aa.aa.aa.aa.aa></code>	- Configures the Mac Address of the Supplicant to initiate an authentication session
---------------	--	--

Description

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config)# dot1x init-session 00:01:02:03:04:05`



- The supplicant MAC address must be authorized prior to the execution of this command.

Related commands

- `dot1x init session-reauth` - initiates dot1x reauthentication session

21.7 dot1x init session-reauth

This command initiates dot1x reauthentication session. When the supplicant has exceeded the timelimit for accessing the protected network, the supplicant is forced for reauthentication. This is to ensure that the supplicant is the same entity that was initially authenticated. The time is specified in seconds. The value ranges between 1 and 65535. The default value is 3600. Reauthentication can be done manually by configuring the MAC of the supplicant.

```
dot1x init session-reauth <supp addr - aa.aa.aa.aa.aa.aa>
```

Syntax Description	<code><supp addr - aa.aa.aa.aa.aa.aa></code>	- Configures the MAC address of the supplicant who requested for authentication for accessing a protected resource.
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Mode	Global Configuration Mode
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Package	Workgroup, Enterprise and Metro
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Example	<code>iss(config)# dot1x init session-reauth 00:01:02:03:04:05</code>
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On execution of this command, the authenticator initiates re-authentication for the specified supplicant MAC address.

Related Commands	<ul style="list-style-type: none">• <code>dot1x init-session</code> - initiates dot1x authentication session
-------------------------	--

21.8 dot1x default

This command configures dot1x with default values for this port. The previous configurations on this port are reset to the default values. These details are not displayed but are the basic settings for a port.

dot1x default

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Example `iss(config-if)# dot1x default`

Related Command • **show dot1x** - Displays dot1x interface information

21.9 dot1x max-req

This command sets the maximum number of EAP (Extensible Authentication Protocol) retries to the client by the authenticator before restarting authentication process. The no form of the command sets the maximum number of EAP retries to the client to default value.

```
dot1x max-req <count (1-10)>
```

```
no dot1x max-req
```

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults count - 2

Example iss(config-if)# dot1x max-req 5



The default value of this command must be changed only to adjust for unusual circumstances such as unreliable links or specific behavioral problems with authentication server/local clients.

Related Command

- **show dot1x** - Displays dot1x information

21.10 dot1x max-start

This command sets the maximum number of EAPOL retries to the authenticator. The no form of the command sets the maximum number of EAPOL retries to the authenticator to its default value. The value range is 1 to 65535.

```
dot1x max-start <count (1-65535)>
```

```
no dot1x max-start
```

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 3

Example iss(config-if)# dot1x max-start 2

Related Command

- **show dot1x** - Displays dot1x information

21.11 dot1x reauthentication

This command enables periodic re-authentication from authenticator to client. The no form of the command disables periodic re-authentication from authenticator to client. The periodic reauthentication is requested to ensure if the same supplicant is accessing the protected resources. The amount of time between periodic re-authentication attempts can be configured manually.

dot1x reauthentication

no dot1x reauthentication

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Periodic re-authentication is disabled

Example `iss(config-if)# no dot1x reauthentication`

Related Commands

- **dot1x default** - Configures dot1x with default values for this port
- **dot1x timeout** - Sets the dot1x timers
- **show dot1x** - Displays dot1x information

21.12 dot1x timeout

This command sets the dot1x timers. The no form of the command sets the dot1x timers to the default values. The timer module manages timers, creates memory pool for timers, creates timer list, starts and stops timer. It provides handlers to respective expired timers.

```
dot1x timeout {quiet-period <value (0-65535)> | {reauth-period | server-
timeout | supp-timeout | tx-period | start-period | held-period | auth-period
}<value (1-65535)>}
```

```
no dot1x timeout {quiet-period | reauth-period | server-timeout | supp-timeout
| tx-period | start-period | held-period | auth-period}
```

Syntax Description	quiet-period <value (0-65535)>	- Configures the quiet-period. Number of seconds that the switch remains in the quiet state following a failed authentication exchange with the client
	reauth-period	- Configures the reauth-period. Number of seconds between re-authentication attempts
	server-timeout	- Configures the number of seconds that the switch waits for the retransmission of packets to the authentication server
	supp-timeout	- Configures the number of seconds that the switch waits for the retransmission of packets to the client
	tx-period	- Configures the number of seconds that the switch waits for a response to an EAP-request/identity frame, from the client before retransmitting the request
	start-period	- Configures the number of seconds that the supplicant waits between successive retries to the authenticator
	held-period	- Configures the number of seconds that the supplicant waits before trying to acquire the authenticator
	auth-period <value (1-65535)>	- Configures the number of seconds that the supplicant waits before timing-out the authenticator
Mode	Interface Configuration Mode	
Package	Workgroup, Enterprise and Metro	
Defaults	quiet-period	- 60 seconds

reauth-period	-	3600 seconds
server-timeout	-	30 seconds
supp-timeout	-	30 seconds
tx-period	-	30 seconds
start-period	-	30 seconds
held-period	-	60 seconds
auth-period	-	30 seconds

Example `iss(config-if)# dot1x timeout quiet-period 30`
`iss(config-if)# dot1x timeout supp-timeout 25`



Only one timer can be configured using this command, that is, the user can configure either the quiet-period or tx-period, but not both.

**Related
Commands**

- **dot1x default** - Configures dot1x with default values for this port
- **dot1x max-req** - Sets the maximum number of EAP retries to the client before restarting authentication process
- **dot1x reauthentication** - Enables periodic re-authentication of the client
- **show dot1x** - Displays dot1x information

21.13 dot1x port-control

This command configures the authenticator port control parameter. The no form of the command sets the authenticator port control state to force authorized. The dot1x exercises port based authentication to increase the security of the network. The different modes employed to the ports offer varied access levels. The 802.1x protocol is supported on both Layer 2 static-access ports and Layer 3 routed ports

```
dot1x port-control {auto|force-authorized|force-unauthorized}
```

```
no dot1x port-control
```

Syntax Description n	auto	- Configures the 802.1x authentication process in this port. Causes the port to begin the unauthorized state, allowing only EAPOL frames to be sent and received through the port. The authentication process begins when the link state of the port transitions from down to up or when an EAPOL-start frame is received. The switch requests the identity of the client and begins relaying authentication messages between the client and the authentication server. The switch can uniquely identify each client attempting to access the network by the client's MAC address.
	force-authorized	- Configures the port to allow all the traffic through this port. Disables 802.1X authentication and causes the port to transit to the authorized state without requiring authentication exchange. The port transmits and receives normal traffic without 802.1X-based authentication of the client.
	force-unauthorized	- Configures the port to block all the traffic through this port. Causes the port to remain in the unauthorized state, ignoring all attempts by the client to authenticate. The switch cannot provide authentication services to the client through the interface.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults force-authorized

Example `iss(config-if)# dot1x port-control auto`



- The auto keyword can be used only if the port is not configured.

**Related
Commands**

- `dot1x default` - Configures dot1x with default values for this port
- `switchport mode dot1q-tunnel` - Enables dot1q-tunneling on the specified interface
- `show dot1x` - Displays dot1x information

21.14 dot1x access-control

This command configures the supplicant access control. This setting is for the application of the Supplicant authorization state when the port is operating as both Supplicant and Authenticator. The no form of the command sets the access control to inactive.

```
dot1x access-control {active | inactive}
```

```
no dot1x access-control
```

Syntax Description	active	- Configures the port to apply both the Supplicant authorization state and Authenticator authorization state.
	inactive	- Configures the port to use only the Authenticator authorization state to restrict access to the port and not the Supplicant authorization state

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults inactive

Example iss(config-if)# dot1x access-control active

Related Command

- **show dot1x** - Displays dot1x information

21.15 dot1x control-direction

This command configures port control direction.. The switch port authenticates incoming packets and outgoing packets. The direction can be configured manually by selecting either in or both. By default the value is both. The no form of the command sets the authenticator port control direction to both

```
dot1x control-direction {in | both}
```

```
no dot1x control-direction
```

Syntax Description	in	- Configures the port to authenticate only the incoming packets.
	both	- Configures the port to authenticate both incoming and outgoing packets

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults both

Example iss(config-if)# dot1x control-direction in

Related Command

- **show dot1x** - Displays dot1x information

21.16 dot1x auth-mode

This command configures the authentication mode of a port as either port-based or mac-based. Port based authentication has different modes of authentication. MAC based authentication allows secured mac addresses to pass through the port. Non secure mac addresses are dropped.

```
dot1x auth-mode {port-based | mac-based}
```

```
no dot1x auth-mode
```

Syntax Description	port-based	- Configures the port's authentication mode to Port-based. The port authenticates the host to use the restricted resource. The port state is changed to authorized. The traffic flows through the port without any access restriction till any event that causes the port state to become unauthorized.
	mac-based	- Configures the port to MAC-based authentication. On receiving tagged/untagged data/control frames from the CFA Module, it checks if the source MAC is present in the Authenticator Session Table and is authorized. <ul style="list-style-type: none"> • If it is present in the table and is authorized, the result is passed to CFA, which then forwards the frame to the appropriate destination module. • If it is present in the table but not authorized, the CFA Module is intimated and the frame is dropped at the CFA Module. • If neither of the above occurs, the Authenticator will initiate a new authentication session for that source MAC address and return the unauthorized status to the CFA Module, which then drops the frame

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults port-based

Example `iss(config-if)# dot1x auth-mode mac-based`



To configure the auth mode of a port as mac-based, port control of the port must be set as auto.

Related Command

- `dot1x port-control` - Configures the authenticator port control parameter

21.17 dot1x host-mode

This command configures the port authentication mode of a port as either multi-host or single-host.

This command is a standardized implementation of the existing command; **dot1x auth-mode**. It operates similar to the existing command.

```
dot1x host-mode {multi-host | single-host}
```

Syntax Description	multi-host	- More than one host can be connected to the port using an Ethernet hub attached to the port. Performs port-based authentication.
	single-host	- Only one host can be connected to the port. Performs mac-based authentication.

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults multi-host

Example `iss(config-if)# dot1x host-mode single-host`



Port control of the port must be set as auto to configure the authentication mode of the port as single-host.

Related Command **dot1x port-control** - Configures the authenticator port control parameter

21.18 dot1x re-authenticate

This command initiates re-authentication of all dot1x-enabled ports or the specified dot1x-enabled port. Re-authentication is manually configured if periodic reauthentication is not enabled. Re-authentication is requested by the authentication server to the supplicant to furnish the identity without waiting for the configured number of seconds (re-authperiod). If no interface is specified, reauthentication is initiated on all dot1x ports

dot1x re-authenticate [interface <interface-type><interface-id>]

Syntax Description	<interface type>	<ul style="list-style-type: none"> - Configures the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
	<interface id>	<ul style="list-style-type: none"> - Configures the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan id
Mode	Privileged EXEC Mode	
Package	Workgroup, Enterprise and Metro	
Example	iss# dot1x re-authenticate interface fastethernet 0/1	
Related Command	<ul style="list-style-type: none"> • show dot1x - Displays dot1x information 	

21.19 dot1x initialize

This command initializes the state machines and sets up the environment for fresh authentication.

This command is a standardized implementation of the existing command; **dot1x re-authenticate**.. It operates similar to the existing command.

dot1x initialize [interface <interface-type> <interface-id>]

Syntax Description	interface	- Interface to be re-authenticated. This specifies the type of interface and interface identifier.
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Mode	Privileged EXEC Mode
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Package	Workgroup, Enterprise and Metro
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Example	iss# dot1x initialize interface fastethernet 0/1
----------------	--



- This command re-authenticates a client without waiting for the configured interval (in seconds) between re-authentication attempts (re-authperiod) and automatic re-authentication.
- If no interface is specified, reauthentication is initiated on all dot1x ports.

Related Command	show dot1x - Displays dot1x information
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21.20 debug dot1x

This command enables debugging of dot1x module. The no form of the command disables debugging of dot1x module. The failure messages and error information are captured by the debug traces. Different traces are enabled to capture particular performance failures. Only one trace can be enabled at a time.

```
debug dot1x {all | errors | events | packets | state-machine | redundancy | registry}
```

```
no debug dot1x {all | errors | events | packets | state-machine | redundancy | registry}
```

Syntax Description	all	- All dot1x debug messages
	errors	- Generates debug statement for all failure traces of the below mentioned traces
	events	- Generates debug statements for event handling traces. This trace is generated when there is a failure in state machine or event processing
	packets	- Generates debug statements for packets handling traces. This trace is generated when there is an error condition in transmission or reception of packets.
	state-machine	- Generates debug statements for state machine handling traces. This trace is generated when there is an error condition in State Machine
	redundancy	- Generates debug statements for redundancy code flow traces. This trace is generated when there is a failure in redundancy processing
	registry	- dot1x registry debug messages. This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults Events Debugging is enabled

Example `iss# debug dot1x all`

**Related
Command** `show dot1x` – Displays dot1x information

21.21 show dot1x

This command displays dot1x information. The configured information can be viewed by running this show command. When there is any change in the configuration to ensure that the port is configured as desired, the show command is used.

```
show dot1x [{ interface <interface-type> <interface-id> | statistics interface
<interface-type> <interface-id> | supplicant-statistics interface <interface-
type> <interface-id>|local-database | mac-info [address <aa.aa.aa.aa.aa.aa>] |
mac-statistics [address <aa.aa.aa.aa.aa.aa>] | all }]
```

Syntax Description n	<interface type>	<ul style="list-style-type: none"> - Displays the specified type of interface. The interface can be: <ul style="list-style-type: none"> • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
	<interface id>	<p>Displays the specified interface identifier. This is a unique value that represents the specific interface.</p> <p>This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan</p> <p>For example: 0/1 represents that the slot number is 0 and port number is 1.</p> <p>Only i-lan ID is provided, for interface types i-lan. For example: 1 represents i-lan ID.</p>
	statistics interface	<ul style="list-style-type: none"> - Displays dot1x authenticator port statistics parameters for the switch or the specified interface
	supplicant-statistics interface	<ul style="list-style-type: none"> - Displays dot1x supplicant statistics parameters for the switch or the specified interface
	local-database	<ul style="list-style-type: none"> - Displays dot1x authentication server database with user name and password

- mac-info** - Displays dot1x MAC session
- mac-statistics** - Displays dot1x MAC statistic
- all** - Displays dot1x status for all interfaces

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```

iss# show dot1x

Sysauthcontrol           = Enabled
Module Oper Status      = Enabled
Dot1x Protocol Version   = 2
Dot1x Authentication Method = Local
Nas ID                   = fsNas1

iss# show dot1x local-database

Pnac Authentication Users Database
-----
User name       : brg2
Protocol        : 4
Timeout         : 0 seconds
Ports           : Gi0/1, Gi0/2, Gi0/3, Gi0/4, Gi0/5, Gi0/6, Gi0/7,
Gi0/8, Gi0/9,
Gi0/10, Gi0/11, Gi0/12, Gi0/13, Gi0/14, Gi0/15, Gi0/16, Gi0/17,
Gi0/18, Gi0/19,
Gi0/20, Gi0/21, Gi0/22, Gi0/23, Gi0/24
Permission      : Allow
-----

iss# show dot1x  all

```

When access-control is made inactive for Gi0/1 and Gi0/2:

```

Dot1x Info for Gi0/1
-----
AuthMode           = PORT-BASED
PortStatus         = AUTHORIZED
AccessControl      = INACTIVE

AuthSM State       = FORCE AUTHORIZED
SuppSM State       = FORCE AUTHORIZED
BendSM State       = INITIALIZE
AuthPortStatus     = AUTHORIZED
SuppPortStatus     = AUTHORIZED
AdminControlDirection = BOTH
OperControlDirection = BOTH
MaxReq             = 2
Port Control       = Force Authorized
QuietPeriod        = 60 Seconds
Re-authentication  = Disabled

```

```

ReAuthPeriod      = 3600 Seconds
ServerTimeout     = 30 Seconds
SuppTimeout       = 30 Seconds
Tx Period         = 30 Seconds

```

Dot1x Info for Gi0/2

```
-----
```

```

AuthMode           = PORT-BASED
PortStatus         = AUTHORIZED
AccessControl      = INACTIVE

AuthSM State       = INITIALIZE
SuppSM State       = DISCONNECTED
BendSM State       = INITIALIZE
AuthPortStatus     = AUTHORIZED
SuppPortStatus     = UNAUTHORIZED
AdminControlDirection = BOTH
OperControlDirection = BOTH
MaxReq             = 2
Port Control       = Force Authorized
QuietPeriod        = 60 Seconds
Re-authentication  = Disabled
ReAuthPeriod       = 3600 Seconds
ServerTimeout      = 30 Seconds
SuppTimeout        = 30 Seconds
Tx Period          = 30 Seconds

```

```
iss# show dot1x statistics interface gigabitethernet 0/1
```

PortStatistics Parameters for Dot1x

```
-----
```

```

TxReqId           = 1
TxReq             = 0
TxTotal           = 1

RxStart           = 0
RxLogoff          = 0
RxRespId          = 0
RxResp            = 0

RxInvalid         = 0
RxLenErr          = 0
RxTotal           = 0

RxVersion         = 0
LastRxSrcMac      = 00:00:00:00:00:00

```

```
iss# show dot1x supplicant-statistics interface gigabitethernet 0/1
```

PortStatistics Parameters for Dot1x-Supplicant

```
-----
```

```

TxStart           = 2
TxRespId          = 0

```

```

TxResp           = 0
TxLogoff         = 0
TxTotal          = 2

RxReqId          = 0
RxReq            = 0

RxInvalid        = 0
RxLenErr         = 0
RxTotal          = 0

RxVersion        = 0
LastRxSrcMac     = 00:00:00:00:00:00

```



- If an interface is not specified, global parameters and a summary appear.
- Expressions are case sensitive.
- If address is not specified for mac-info and mac-statistics, then this command displays the MAC sessions and MAC statistics of all the supplicant MAC addresses.

Related Command

- **dot1x default** - Configures dot1x with default values for that port.
- **dot1x local-database** - Configures dot1x local database with values.
- **dot1x system-auth-control** - Enables dot1x in the switch
- **aaa authentication dot1x default** - Configures if the authentication is remote or local
- **set nas-id** - Configures the nas-id for the dot1x
- **dot1x default** - Configures dot1x with default values for the port
- **dot1x max-req** - Configures the maximum number of EAP retries to the client.
- **dot1x reauthentication** - Configures the periodic reauthentication for the client
- **dot1x timeout** - Sets the dot1x timers
- **dot1x port-control** - Configures the dot1x port control parameters
- **dot1x access-control** - Configures the supplicant access control
- **dot1x control-direction** - Configures the port control direction
- **dot1x re-authenticate** - Initiates re-authentication of all dot1x enabled ports
- **shutdown dot1x** - Shuts down the dot1x feature
- **debug dot1x** - Debugs the dot1x for specified traces

Chapter

22

MRP

MRP (Multiple Registration Protocol) is a simple, distributed, and many-to-many protocol that supports efficient, reliable, and rapid declaration and registration of the attributes by multiple participants on shared and virtual shared media.

MRP also incorporates optimizations to speed attribute declarations and withdrawals on point-to-point media.

Interface Masters MRP is a portable software implementation of the Multiple Registration Protocol specification as defined in the 802.1ak-2007 specification from IEEE, and is compliant with IEEE P802.1ap/D3.2 (Management Information Base) for MRP related objects.

The list of CLI commands for the configuration of MRP is as follows:

- shutdown mrp
- set mvrp / mmrp
- set mvrp dynamic-vlan-creation
- set port mvrp / mmrp
- set port mrp / mvrp periodictimer
- set port mrp - participant
- set port mmrp applicant
- set port mvrp applicant
- set port mrp timer
- set port mvrp timer
- set vlan / mac notify failed-registration
- clear mrp / mvrp / mmrp statistics
- clear mvrp counters

- clear mvrp / mmrp configuration
- set port mvrp registration
- mrp vlan restricted
- mrp mac-address restricted
- debug mrp
- show mrp / mvrp / mmrp configuration
- show mrp / mvrp / mmrp statistics
- show mvrp machines
- show mmrp machines
- show mrp timer

22.1 shutdown mrp

This commands shuts down MRP module in the switch. This command also enables the MVRP (Multiple VLAN Registration Protocol) and MMRP (Multiple MAC Registration Protocol) in the switch. The no form of the command starts MRP module in the switch.

shutdown mrp

no shutdown mrp

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults MRP is started for default context and is shutdown for other contexts.

Example

```
iss(config)# shutdown mrp
iss(config-switch)# shutdown mrp
```



- GARP should be shutdown, before starting the MRP module.
- Bridge mode should be set for the created context, before executing this command to shut down or start the MRP.
- MRP can be shutdown, only when none of the MRP (MVRP, MMRP) applications are enabled.
- All allocated memory is released, when the MRP module is shutdown.
- **shutdown garp** – Globally disables GARP
- **bridge-mode- Metro** - Configures the bridge mode of the Switch
- **set port mvrp / mmrp** - Enables / disables the MVRP / MMRP application on the port
- **set port mrp / mvrp periodictimer** -Enables / disables the periodic timer on the port
- **set port mrp - participant** - Sets the participant type on a port
- **set port mmrp applicant** - Sets the MMRP applicant administrative control status of a port
- **set port mvrp applicant** - Sets the MVRP applicant administrative control status of a port
- **set port mrp timer / set port mvrp timer** - Sets MRP timer on the port
- **set vlan / mac notify failed-registration** - Enables / disables the trap for notifying VLAN / MAC registration failure
- **set port mvrp registration** - Configures the registrar admin control in a port

Related Command

- **mrp vlan restricted** - Enables / disables the restricted VLAN registration on the port
- **mrp mac-address restricted** - Enables / disables restricted MAC address registration on the port
- **debug mrp** - Sets the debug level
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.2 set mvrp / mmrp

This command enables / disables the MVRP / MMRP application in the switch, and also starts the MRP module. This command affects all MVRP/MMRP applicant and registrar state machines.

```
set { mvrp | mmrp } { enable | disable }
```

Syntax Description	mvrp	- Multiple VLAN Registration Protocol application
	mmrp	- Multiple MAC Registration Protocol application
	enable	- Enables the application (MVRP / MMRP) in the switch
	disable	- Disables the application (MVRP / MMRP) in the switch

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Both the MVRP and MMRP applications are enabled in the switch, once the MRP is started.

Example

```
iss(config)# set mvrp enable
iss(config-switch)# set mvrp enable
```



- All MVRP / MMRP state machines on all ports are reset, when MVRP / MMRP application is enabled.
- All MMRP / MVRP packets are forwarded transparently, when the MMRP / MVRP application is disabled in the switch.
- The status of the application is retained across re-initialization of the management system.

Related Command

- **set port mvrp / mmrp** - Enables / disables the MVRP / MMRP application on the port
- **set port mvrp / mmrp periodictimer** - Enables / disables the periodic timer on the port
- **set port mvrp - participant** - Sets the participant type on a port
- **set port mmrp applicant** - Sets the MMRP applicant administrative control status of a port
- **set port mvrp applicant** - Sets the MVRP applicant administrative control status of a port

- **set port mrp timer / set port mvrp timer** - Sets MRP timer on the port
- **set vlan / mac notify failed-registration** - Enables / disables the trap for notifying VLAN / MAC registration failure
- **set port mvrp registration** - Configures the registrar admin control in a port
- **mrp vlan restricted** - Enables / disables the restricted VLAN registration on the port
- **mrp mac-address restricted** - Enables / disables restricted MAC address registration on the port
- **debug mrp** - Sets the debug level
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.3 set mvrp dynamic-vlan-creation

This command enables /disables the MVRP application in the switch and also starts the MRP module. This command affects all MVRP applicant and registrar state machines.

This command is a standardized implementation of the existing command; **set mvrp / mmrp**. It operates similar to the existing command.

```
set mvrp dynamic-vlan-creation { enable | disable }
```

Syntax Description **enable** - Enables the MVRP application in the switch

disable - Disables the MVRP application in the switch

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults enable

Example `iss(config)# set mvrp dynamic-vlan-creation enable`
`iss(config-switch)# set mvrp dynamic-vlan-creation enable`



- All MVRP state machines on all ports are reset, when disabled MVRP application is enabled.
- All MVRP packets are forwarded transparently, when the MVRP application is disabled in the switch.
- The status of the application is retained across re-initialization of the management system.

Related Command

- **set port mvrp / mmrp** - Enables / disables the MVRP / MMRP application on the port
- **set port mrp / mvrp periodictimer** - Enables / disables the periodic timer on the port
- **set port mrp - participant** - Sets the participant type on a port
- **set port mmrp applicant** - Sets the MMRP applicant administrative control status of a port
- **set port mvrp applicant** - Sets the MVRP applicant administrative control status of a port
- **set port mrp timer / set port mvrp timer** - Sets MRP timer on the port
- **set vlan / mac notify failed-registration** - Enables / disables the trap for notifying VLAN / MAC registration failure

- **set port mvrp registration** - Configures the registrar admin control in a port
- **mrp vlan restricted** - Enables / disables the restricted VLAN registration on the port
- **mrp mac-address restricted** - Enables / disables restricted MAC address registration on the port
- **debug mrp** - Sets the debug level
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.4 set port mvrp / mmrp

This command enables / disables the MVRP / MMRP application on the port. This command affects all MVRP applicant and registrar state machines.

```
set port { mvrp | mmrp } <interface-type> <interface-id> { enable | disable }
```

Syntax Description	mvrp	- Multiple VLAN Registration Protocol application
	mmrp	- Multiple MAC Registration Protocol application
	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	enable	- Enables the application (MVRP / MMRP) on the port
	disable	- Disables the application (MVRP / MMRP) on the port

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Both the MVRP and MMRP applications are enabled on all the ports of the switch.

Example

```
iss(config)# set port mvrp gigabitethernet 0/1 disable
iss(config-switch)# set port mvrp gigabitethernet 0/1 disable
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.
- Any MMRP/MVRP packets received on the port is discarded silently, and no MMRP/MVRP registrations are propagated from other ports, if the MMRP/MVRP is disabled on the port while enabled in the switch.
- All MVRP / MMRP state machines on the port are reset, when MVRP / MMRP application is enabled on the port.

**Related
Command**

- The status of the application is retained across re-initialization of the management system.
- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.5 set port mrp / mvrp periodictimer

This command enables / disables the periodic timer on the port. The MRP / MVRP periodic state machine generates transmission events on a periodic basis, against all applicant state machines that are associated with the port, when the periodic timer is enabled on the port.

```
set port { mrp | mvrp } <interface-type> <interface-id> periodictimer { enable
| disable }
```

Syntax Description

mrp	- Multiple Registration Protocol
mvrp	- Multiple VLAN Registration Protocol application
interface-type	- Interface type. This can be: <ul style="list-style-type: none"> GigabitEthernet FastEthernet
interface-id	- Interface identifier. This is a combination of slot number and port number.
enable	- Enables the periodic timer
disable	- Disables the periodic timer

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Periodic timer is disabled on the port.

Example

```
iss(config)# set port mrp gigabitethernet 0/1 periodictimer
enable

iss(config-switch)# set port mrp gigabitethernet 0/1
periodictimer enable
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.


**Related
Command**

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details
- **show mrp timer** - Displays MRP timer related information

22.6 set port mrp - participant

This command sets the participant type on a port.

```
set port mrp <interface-type> <interface-id> participant { full-participant |
applicant-only }
```

Syntax Description	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	full-participant	- Participant type that implements the complete applicant state machine and the registrar state machine for each attribute declared, registered or tracked, together with a single instance of the LeaveAll state machine and the periodic state machine.
	applicant-only	- Participant type that implements the applicant state machine with omission of certain states and actions (as specified by Table 10-3 in IEEE Standard 802.1ak-2007), for each attribute declared or tracked, together with a single instance of the periodic state machine. <div>  LeaveAll state machine and registrar state machine are not applicable for this participant type. </div>

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Participant type is set as **full-participant**.

Example

```
iss(config)# set port mrp gigabitethernet 0/1 participant
applicant-only

iss(config-switch)# set port mrp gigabitethernet 0/1
participant applicant-only
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.

**Related
Command**

- Port should be mapped to the context, before executing this command.
- `no shutdown mvp` - Starts MRP module in the switch
- `set mvp / mmvp` - Enables / disables the MVRP / MMRP application in the switch
- `set mvp dynamic-vlan-creation` - Enables /disables the MVRP application in the switch
- `map switch` - Maps the port to the Context

22.7 set port mmrp applicant

This command sets the MMRP applicant administrative control status of a port.

```
set port mmrp { mac | service-requirement } <interface-type> <interface-id>
applicant { normal | non-participant }
```

Syntax Description	mac	- MAC Vector Attribute type of MMRP application.
	service-requirement	- Service Requirement Vector Attribute type of MMRP application.
	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	normal	- Applicant admin control status, which indicates that the applicant participates normally in MRPDUs exchanges.
	non-participant	- Applicant admin control status, which indicates that the MRP participant does not transmit any MRPDUs

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Applicant admin control status is set as **normal**.

Example

```
iss(config)# set port mmrp mac gigabitethernet 0/1 applicant
non-participant

iss(config-switch)# set port mmrp mac gigabitethernet 0/1
applicant non-participant
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.

**Related
Command**

- **no shutdown mvp** - Starts MRP module in the switch
- **set mvp / mmvp** - Enables / disables the MVRP / MMVP application in the switch
- **set mvp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mvp / mvp / mmvp configuration** - Displays MRP configuration details

22.8 set port mvrp applicant

This command sets the MVRP applicant administrative control status of a port.

```
set port mvrp <interface-type> <interface-id> applicant { normal | non-
participant | active }
```

Syntax Description	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	normal	- Applicant admin control status, which indicates that the applicant participates normally in MRPDUs exchanges.
	non-participant	- Applicant admin control status, which indicates that the MRP participant does not transmit any MRPDUs
	active	- Applicant admin control status that allows to send VLAN declarations, when the port is in the blocking state.

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults Applicant admin control status is set as **normal**.

Example

```
iss(config)# set port mvrp gigabitethernet 0/1 applicant non-
participant

iss(config-router)# set port mvrp gigabitethernet 0/1 applicant
non-participant
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP

application in the switch

- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.9 set port mrp timer

This command sets MRP timer (Join, Leave or LeaveAll) on a port irrespective of the application (MVRP/MMRP).

```
set port mrp <interface-type> <interface-id> timer { join | leave | leaveall }
<time in centi seconds>
```

Syntax Description	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	join	- MRP Join time. This time defines the time interval (in centi-seconds) between transmit opportunities. This value ranges between 20 and 10000000 centi-seconds.
	leave	- MRP Leave time. This defines the time (in centi-seconds) that the Registrar state machine should wait in LV state before transiting to an MT state. This value ranges between 60 and 10000000 centi-seconds.
	leaveall	- MRP LeaveAll time. This defines the time interval (in centi-seconds) in which all the leaveall message is generated. This value ranges between 1000 and 10000000 centi-seconds.
	time in centi second	- Specifies the time (in centi-seconds) to be set for the MRP timer.

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults	join	- 20 centi seconds
	leave	- 60 centi seconds
	leaveall	- 1000 centi seconds

Example `iss(config)# set port mvrp gigabitethernet 0/1 timer join 25`

`iss(config-router)# set port mvrp gigabitethernet 0/1 timer join 25`



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.
- The time should be retained across re-initialization of the management system.
- Leave timer should be greater than two times of Join timer, and Leave-all timer should be greater than Leave timer. The timer value cannot be zero.

Related Command

- `no shutdown mrp` - Starts MRP module in the switch
- `set mvrp / mmrp` - Enables / disables the MVRP / MMRP application in the switch
- `set mvrp dynamic-vlan-creation` - Enables /disables the MVRP application in the switch
- `map switch` - Maps the port to the Context
- `show mrp / mvrp / mmrp configuration` - Displays MRP configuration details
- `show mrp timer` - Displays MRP timer related information

22.10 set port mvrp timer

This command sets MRP timer (Join, Leave or LeaveAll) on a port irrespective of the application (MVRP/MMRP).

This command is a standardized implementation of the existing command; **set port mrp timer**. It operates similar to the existing command.

```
set port mvrp <interface-type> <interface-id> timer { join | leave | leaveall
} <time in centi seconds>
```

Syntax Description	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	join	- MRP Join time. This time defines the time interval (in centi-seconds) between transmit opportunities. This value ranges between 20 and 10000000 centi-seconds.
	leave	- MRP Leave time. This defines the time (in centi-seconds) that the Registrar state machine should wait in LV state before transiting to a MT state. This value ranges between 60 and 10000000 centi-seconds.
	leaveall	- MRP LeaveAll time. This defines the time interval (in centi-seconds) in which all the leaveall message is generated. This value ranges between 1000 and 10000000 centi-seconds.
	time in centi second	- Specifies the time (in centi-seconds) to be set for the MRP timer.
Mode	Global Configuration mode / Switch Configuration mode	
Package	Workgroup, Enterprise and Metro	
Defaults	join	- 20 centi seconds

leave - 60 centi seconds

leaveall - 1000 centi seconds

Example

```
iss(config)# set port mrp gigabitethernet 0/1 timer join 25
```

```
iss(config-router)# set port mrp gigabitethernet 0/1 timer join 25
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.
- The time should be retained across re-initialization of the management system.
- Leave timer should be greater than two times of Join timer, and Leave-all timer should be greater than Leave timer. The timer value cannot be zero.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details
- **show mrp timer** - Displays MRP timer related information

22.11 set vlan / mac notify failed-registration

This command enables / disables the trap for notifying VLAN / MAC registration failure.

```
set { vlan | mac } notify failed-registration { enable | disable }
```

Syntax Description

- | | |
|----------------|------------------------------|
| vlan | - VLAN registration failures |
| mac | - MAC registration failures |
| enable | - Enables trap notification |
| disable | - Disables trap notification |

Mode

Global Configuration mode / Switch Configuration mode

Package

Workgroup, Enterprise and Metro

Defaults

Trap notification is disabled.

Example

```
iss(config)# set vlan notify failed-registration enable
iss(config-router)# set vlan notify failed-registration enable
```



MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context

22.12 clear mrp / mvrp / mmrp statistics

This command resets MRP statistics values.

```
clear { mrp | mvrp | mmrp } statistics { all | port <interface-type>
<interface-id> }
```

Syntax Description	mrp	- Multiple Registration Protocol applications (that is, both MVRP and MMRP applications)
	mvrp	- Multiple VLAN Registration Protocol application
	mmrp	- Multiple MAC Registration Protocol application
	all	- Clears statistics of all the ports
	port	- Clears statistics of specified port <ul style="list-style-type: none"> • interface-type - Interface type. This can be: GigabitEthernet or FastEthernet • interface-id - Interface identifier. This is a combination of slot number and port number.

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config)# clear mrp statistics all
iss(config-router)# clear mrp statistics all
```



Port should have been mapped to the context, before executing this command to clear the statistics of specified port.

Related Command

- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp statistics** - Displays MRP statistics information

22.13 clear mvrp counters

This command clears MVRP counters for all the ports on the switch.

This command is a standardized implementation of the existing command; **clear mvrp statistics all**. It operates similar to the existing command.

clear mvrp counters

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Example iss(config)# clear mvrp counters

Related Command

show mrp / mvrp / mmrp statistics - Displays MRP statistics information

22.14 clear mvrp / mmrp configuration

This command clears MRP configurations and resets context or port related MVRP / MMRP objects to its default values.

```
clear { mvrp | mmrp } configuration {all | port <interface-type> <interface-id> }
```

Syntax Description

- | | |
|-----------------------|--|
| mvrp | - Multiple VLAN Registration Protocol application |
| mmrp | - Multiple MAC Registration Protocol application |
| interface-type | - Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet |
| interface-id | - Interface identifier. This is a combination of slot number and port number. |

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config)# clear mvrp configuration port gigabitethernet 0/1

iss(config-switch)# clear mvrp configuration port
gigabitethernet 0/1
```



Port should have been mapped to the context, before executing this command to clear the configurations of the specified port.

Related Command

- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.15 set port mvrp registration

This command configures the registrar admin control in a port.

```
set port mvrp <interface-type> <interface-id> registration {normal | fixed | forbidden}
```

Syntax Description	interface-type	- Interface type. This can be: <ul style="list-style-type: none"> • GigabitEthernet • FastEthernet
	interface-id	- Interface identifier. This is a combination of slot number and port number.
	normal	- Registrar state machine responds to incoming messages.
	fixed	- Registrar state machine ignores all MRP messages. All the learnt attributes are aged out through the LeaveAll mechanism.
	forbidden	- Registrar state machine ignores all MRP messages. All the learnt attributes are removed immediately.

Mode Global Configuration mode / Switch Configuration mode

Package Workgroup, Enterprise and Metro

Defaults normal

Example

```
iss(config)# set port mvrp gi 0/1 registration fixed
iss(config-router)# set port mvrp gi 0/1 registration fixed
```



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch

- `set mvrp dynamic-vlan-creation` - Enables /disables the MVRP application in the switch
- `map switch` - Maps the port to the Context

22.16 mrp vlan restricted

This command enables / disables the restricted VLAN registration on the port.

```
mrp vlan restricted { enable | disable }
```

Syntax Description **enable** - Enables the restricted VLAN registration

disable - Disables the restricted VLAN registration

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults disable

Example `iss(config-if)# mrp vlan restricted enable`



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.
- The status of the restricted VLAN registration should be retained across re-initializations of the management system
- If restricted VLAN registration is enabled, then creation of a new dynamic VLAN entry is permitted, only if there is a static VLAN registration entry for the concerned VLAN in which the registrar administrative control value for the port is normal registration.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details

22.17 mrp mac-address restricted

This command enables / disables restricted MAC address registration on the port.

```
mrp mac-address restricted { enable | disable }
```

Syntax Description

enable	- Enables restricted MAC address registration
---------------	---

disable	- Disables restricted MAC address registration
----------------	--

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults disable

Example `iss(config-if)# mrp mac-address restricted enable`



- MRP should be started or MMRP/MVRP should be enabled in the switch, before executing this command.
- Port should be mapped to the context, before executing this command.
- The status of the restricted MAC address registration should be retained across re-initializations of the management system
- If restricted MAC address registration is enabled, then creation or modification of Dynamic MAC Address Registration entry as a result of MMRP exchanges on the port is permitted, only if there is a static filtering entry for the concerned VLAN in which the registrar administrative control value is normal registration.

Related Command

- **no shutdown mrp** - Starts MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **map switch** - Maps the port to the Context
- **show mrp / mvrp / mmrp configuration** - Displays MRP configuration details


22.18 debug mrp

This command sets the debug level. The no form of the command disables debug option for MRP module.

```
debug mrp [{global | [init-shut] [mgmt] [data-path] [ctrl] [pkt-dump]
[resource] [all-fail] [buffer] [protocol] [mvrp] [mmrp] [critical] [applicant-
sem] [registrar-sem] [leaveall-sem] [periodic-sem] [mrpdu] [all] [switch
<context-name>]}]
```

```
no debug mrp [{global | [init-shut] [mgmt] [data-path] [ctrl] [pkt-dump]
[resource] [all-fail] [buffer] [protocol] [mvrp] [mmrp] [critical] [applicant-
sem] [registrar-sem] [leaveall-sem] [periodic-sem] [mrpdu] [all] [switch
<context-name>]}]
```

Syntax Description	global	- Trace statements present outside the scope of the virtual context. Such as <ul style="list-style-type: none"> • Traces present in the Task Initialization • Trace statement before identifying the virtual context in MRP APIs
	init-shut	- Init and shutdown traces
	mgmt	- Management traces
	data-path	- Data path traces
	ctrl	- Control plane traces
	pkt-dump	- Packet dump traces
	resource	- Traces related to all resources except buffers
	all-fail	- All failure traces
	buffer	- Buffer allocation / release traces\
	protocol	- MRP related traces
	mvrp	- MVRP related traces

	mmrp	- MMRP related traces
	critical	- MRP critical traces
	applicant-sem	- Applicant state machine related traces
	registrar-sem	- Registrar state machine related traces
	leaveall-sem	- LeaveAll state machine related traces
	periodic-sem	- Periodic transmission state machine related traces
	mrpdu	- MRPDU encoding and decoding related trace
	all	- All traces
	switch <context-name>	- Context / switch name.
Mode	Privileged EXEC Mode	
Package	Workgroup, Enterprise and Metro	
Defaults	critical	
Example	iss# debug mrp global	
	 MRP should be started or MMRP/MVRP should be enabled in the switch, before setting the debug level. This condition is not applicable for setting the debug level as global .	
Related Command	<ul style="list-style-type: none"> • no shutdown mrp - Starts MRP module in the switch • set mvrp / mmrp - Enables / disables the MVRP / MMRP application in the switch • set mvrp dynamic-vlan-creation - Enables /disables the MVRP application in the switch 	

22.19 show mrp / mvrp / mmrp configuration

This command displays MRP configuration details.

```
show { mrp | mvrp | mmrp } configuration [{port <interface-type> <interface-id> | switch <context-name>}]
```

Syntax Description	mrp	- Multiple Registration Protocol applications (that is, both MVRP and MMRP applications)
	mvrp	- Multiple VLAN Registration Protocol application
	mmrp	- Multiple MAC Registration Protocol application
	port <interface-type> <interface-id>	- Specifies the port <ul style="list-style-type: none"> interface-type - Interface type. This can be: GigabitEthernet or FastEthernet interface-id – Interface identifier. This is a combination of slot number and port number.
	switch <context-name>	- Context / switch name.
Mode	Privileged EXEC Mode	
Package	Workgroup, Enterprise and Metro	
Example	<pre>iss# show mrp configuration Switch Name : default ----- % MRP is shutdown. MRP Configurations ----- Switch Name : switch1 ----- MVRP feature is currently Disabled on the Switch. MMRP feature is currently Enabled on the Switch. VLAN Registration failure notification is Disabled. MAC Address Registration failure notification is Disabled. Local Port Id : 1 IfName : Gi0/1 ----- Port MVRP Status : Disabled Port MMRP Status : Enabled</pre>	

```
Restricted VLAN Reg Ctrl : Disabled
Restricted MAC Reg Ctrl  : Disabled
Registrar Admin Control  : Normal
Participant Type         : fullParticipant
Join Timer Value         : 25
Leave Timer Value         : 60
LeaveAll Timer Value      : 1000
Periodic SEM Status      : Disabled
```

AttributeType	ApplicantType
VLAN	Normal
SER-REQ	Normal
MAC	Non-Participant

```
iss# show mrp configuration port gi 0/1
```

MRP Configurations

```
Switch Name : default
```

```
MVRP feature is currently Enabled on the Switch.
MMRP feature is currently Enabled on the Switch.
VLAN Registration failure notification is Disabled.
MAC Address Registration failure notification is Disabled.
```

```
Local Port Id : 1  IfName : Gi0/1
```

```
Port MVRP Status      : Enabled
Port MMRP Status      : Enabled
Restricted VLAN Reg Ctrl : Disabled
Restricted MAC Reg Ctrl : Disabled
Registrar Admin Control : Normal
Participant Type       : fullParticipant
Join Timer Value       : 20
Leave Timer Value       : 60
LeaveAll Timer Value    : 1000
Periodic SEM Status    : Disabled
```

AttributeType	ApplicantType
VLAN	Normal
SER-REQ	Normal
MAC	Normal

```
iss# sh mrp configuration switch switch1
```

MRP Configurations

```
Switch Name : default
```

```
MVRP feature is currently Enabled on the Switch.
MMRP feature is currently Enabled on the Switch.
VLAN Registration failure notification is Disabled.
```

MAC Address Registration failure notification is Disabled.

Local Port Id : 1 IfName : Gi0/1

Port MVRP Status : Enabled
Port MMRP Status : Enabled
Restricted VLAN Reg Ctrl : Disabled
Restricted MAC Reg Ctrl : Disabled
Registrar Admin Control : Normal
Participant Type : fullParticipant
Join Timer Value : 20
Leave Timer Value : 60
LeaveAll Timer Value : 1000
Periodic SEM Status : Disabled

AttributeType	ApplicantType
VLAN	Normal
SER-REQ	Normal
MAC	Normal

iss# show mvrp configuration

MRP Configurations

Switch Name : default

MVRP feature is currently Enabled on the Switch.
VLAN Registration failure notification is Disabled.

Local Port Id : 1 IfName : Gi0/1

Port MVRP Status : Enabled
Restricted VLAN Reg Ctrl : Disabled
Registrar Admin Control : Normal
Participant Type : fullParticipant
Join Timer Value : 20
Leave Timer Value : 60
LeaveAll Timer Value : 1000
Periodic SEM Status : Disabled

AttributeType	ApplicantType
VLAN	Normal

iss# show mmrp configuration

MRP Configurations

Switch Name : default

MMRP feature is currently Enabled on the Switch.
MAC Address Registration failure notification is Disabled.

Local Port Id : 1 IfName : Gi0/1

```
-----
Port MMRP Status      : Enabled
Restricted MAC Reg Ctrl : Disabled
Registrar Admin Control : Normal
Participant Type       : fullParticipant
Join Timer Value       : 20
Leave Timer Value       : 60
LeaveAll Timer Value    : 1000
Periodic SEM Status    : Disabled
```

AttributeType ApplicantType

```
-----
SER-REQ              Normal
MAC                  Normal
```

Related Command

- **shutdown mrp** - Shuts down MRP module in the switch
- **set mvrp / mmrp** - Enables / disables the MVRP / MMRP application in the switch
- **set mvrp dynamic-vlan-creation** - Enables /disables the MVRP application in the switch
- **set port mvrp / mmrp** - Enables / disables the MVRP / MMRP application on the port
- **set port mrp / mvrp periodictimer** -Enables / disables the periodic timer on the port
- **set port mmrp applicant** - Sets the MMRP applicant administrative control status of a port
- **set port mvrp applicant** - Sets the MVRP applicant administrative control status of a port
- **set port mrp timer / set port mvrp timer** - Sets MRP timer on the port
- **clear mvrp / mmrp configuration** - Clears MRP configurations and resets context or port related MVRP / MMRP objects to its default values
- **mrp vlan restricted** - Enables / disables the restricted VLAN registration on the port
- **mrp mac-address restricted** - Enables / disables restricted MAC address registration on the port

22.20 show mrp / mvrp / mmrp statistics

This command displays MRP statistics information.

```
show { mrp | mvrp | mmrp } statistics [{port <interface-type> <interface-id> |  
switch <context-name>}]
```

Syntax Description

mrp	- Multiple Registration Protocol applications (that is, both MVRP and MMRP applications)
------------	--

mvrp	- Multiple VLAN Registration Protocol application
-------------	---

mmrp	- Multiple MAC Registration Protocol application
-------------	--

port <interface-type> <interface-id>	- Specifies the port <ul style="list-style-type: none">• interface-type - Interface type. This can be: GigabitEthernet or FastEthernet.• interface-id – Interface identifier. This is a combination of slot number and port number.
---	--

switch <context-name>	- Context / switch name.
------------------------------------	--------------------------

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# sh mvrp statistics
MRP Port Statistics
-----
Switch Name : default
Local Port Id : 1  IfName : Gi0/1
-----
MRP Application           : MVRP
Mvrp last pdu origin      : 00:11:22:33:44:55
NumberOfRegistrations     : 0
Valid Packets Received    : 1
Invalid Packets Received  : 0
New messages Received     : 1
JoinIn messages Received  : 0
JoinMt messages Received  : 0
Leave messages Received    : 0
Empty messages Received   : 0
In messages Received      : 0
LeaveAll messages Received : 0
Packets Transmitted       : 30
```

```
New messages Transmitted      : 0
JoinIn messages Transmitted    : 29
JoinMt messages Transmitted    : 0
Leave messages Transmitted      : 0
Empty messages Transmitted     : 1
In messages Transmitted        : 0
LeaveAll messages Transmitted: 20
```

```
iss# sh mmrp statistics
```

```
MRP Port Statistics
```

```
-----
```

```
Switch Name : default
```

```
Local Port Id  : 1  IfName : Gi0/1
```

```
-----
```

```
MRP Application           : MMRP
Mmrp last pdu origin      : 00:11:22:33:44:55
NumberOfRegistrations     : 0
Valid Packets Received    : 3
Invalid Packets Received  : 2
New messages Received     : 6
JoinIn messages Received  : 0
JoinMt messages Received  : 0
Leave messages Received    : 0
Empty messages Received   : 0
In messages Received      : 0
LeaveAll messages Received : 0
Packets Transmitted       : 183
New messages Transmitted  : 12
JoinIn messages Transmitted : 168
JoinMt messages Transmitted : 0
Leave messages Transmitted : 1
Empty messages Transmitted : 6
In messages Transmitted   : 2
LeaveAll messages Transmitted: 106
```

**Related
Command**

- **clear mrp / mvrp / mmrp statistics** - Resets MRP statistics values
- **clear mvrp counters** - Clears MVRP counters for all the ports on the switch

22.21 show mvrp machines

This command displays MVRP applicant and registrar state machine information.

```
show mvrp machines [vlan <vlan-range>] [{port <interface-type> <interface-id>
| switch <context-name>}]
```

Syntax Description

vlan <vlan-range> - VLAN identifier. This value ranges between 1 and 4094.

port <interface-type> <interface-id> - Specifies the port
 interface-type - Interface type. This can be: GigabitEthernet or FastEthernet.
 interface-id – Interface identifier. This is a combination of slot number and port number.

switch <context-name> - Context / switch name.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example iss# show mvrp machines vlan 2 switch default

```
Switch Name : default
Port IfName AttrType MapId AttrVal AppState&Mgmt RegState&Mgmt
PeerMacAddr
```

```
-----
1      Gi0/1  VID      0      2      VO&Normal  IN &Normal
00:11:22:33:44:55
```

iss# show mvrp machines vlan 2 port gigabitethernet 0/1

```
Switch Name : default
Port IfName AttrType MapId AttrVal AppState&Mgmt RegState&Mgmt
PeerMacAddr
```

```
-----
1      Gi0/1  VID      0      2      VO&Normal  IN &Normal
00:11:22:33:44:55
```

Related Command

- **set port mvrp applicant** - Sets the MVRP applicant administrative control status of a port

22.22 show mmrp machines

This command displays MMRP applicant and registrar state machine information.

```
show mmrp machines [vlan <vlan-range> {mac <aa:aa:aa:aa:aa:aa> | service-
requirement {forward-all | forward-unreg | both}}] [{port <interface-type>
<interface-id> | switch <context-name>}]
```

Syntax Description	vlan <vlan-range>	- VLAN identifier. This value ranges between 1 and 4094.
	mac <aa:aa:aa:aa:aa:aa>	- MAC address
	service-requirement {forward-all forward-unreg both}	- Type of service requirement.
		<ul style="list-style-type: none"> forward-all - Forwarding information for a VLAN, specifying the set of ports to which all multicasts should be forwarded and configured statically by management and dynamically by MMRP. forward-unreg - Forwarding information for a VLAN, specifying the set of ports to which all multicasts for which there is no more specific forwarding information would be forwarded. both - Service requirement type representing both forward-all and forward-unreg.
	port type> <interface-id> <interface-id>	- Specifies the port <ul style="list-style-type: none"> interface-type - Interface type. This can be: GigabitEthernet or FastEthernet. interface-id – Interface identifier. This is a combination of slot number and port number.
	switch name> <context-name>	- Context / switch name.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example iss# sh mmrp machines vlan 1 mac 01:11:11:11:11:11

```
Switch Name : default
Port  IfName AttrType MapId  AttrVal  AppState&Mgmt
RegState&Mgmt PeerMacAddr
-----
1      Gi0/1    MAC          1      01:11:11:11:11:11  VO&Normal
```

```
IN &Normal 00:11:22:33:44:55
```

```
iss# sh mmrp machines vlan 1 service-requirement forward-all
```

```
Switch Name : default
```

Port	IfName	AttrType	MapId	AttrVal	AppState&Mgmt
------	--------	----------	-------	---------	---------------

RegState&Mgmt	PeerMacAddr
---------------	-------------

1	Gi0/1	SER-REQ	1	0	VO&Normal
---	-------	---------	---	---	-----------

```
IN &Normal 00:11:22:33:44:55
```

**Related
Command**

- **set port mmrp applicant** - Sets the MMRP applicant administrative control status of a port

22.23 show mrp timer

This command displays MRP timer related information.

```
show mrp timer [{ port <interface-type> <interface-id> | switch <context-name>}]
```

Syntax Description

port <interface-type> <interface-id> - Specifies the port

- interface-type - Interface type. This can be: GigabitEthernet or FastEthernet.
- interface-id – Interface identifier. This is a combination of slot number and port number.

switch <context-name> - Context / switch name.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show mrp timer
Switch Name : default
-----
% MRP is shutdown.
Switch Name : switch1
MRP Port Timer Info (in centi seconds)
-----
Join-time  Leave-time  Leave All-time  PeriodicTimer  Port
IfName
-----
25         60             1000            Disabled       1
Gi0/1

iss# show mrp timer switch switch1
Switch Name : switch1
MRP Port Timer Info (in centi seconds)
-----
Join-time  Leave-time  Leave All-time  PeriodicTimer  Port
IfName
-----
25         60             1000            Disabled       1
Gi0/1

iss# show mrp timer port gi 0/1
Switch Name : switch1
```

```
MRP Port Timer Info (in centi seconds)
```

```
-----  
Join-time  Leave-time    Leave All-time  PeriodicTimer  Port  
IfName  
-----  
-----  
25         60             1000             Disabled       1  
Gi0/1
```

**Related
Command**

- `set port mrp / mvrp periodictimer` - Enables / disables the periodic timer on the port
- `set port mrp timer / set port mvrp timer` - Sets MRP timer on the port

Chapter

23

ELMI

Interface Masters ELMI (Ethernet Local Management Interface) is developed to enable the Customer Edge to request and access the status and service attributes of MEN so that it can access the Metro Ethernet Services. This protocol allows the CE to auto-configure itself according to the changes in status and service attributes happening in the MEN.

The protocol provides the status of the EVCs for large Ethernet MANs and WANs. Specifically, E-LMI notifies a CE device of the operating state of an EVC and the time when an EVC is added or deleted. E-LMI also communicates the attributes of an EVC and a UNI to a CE device. This information is then used by CE to auto-configure itself.

The list of commands used for configuring ELMI is as follows:

- shutdown ethernet lmi
- ethernet lmi global
- ethernet lmi interface
- ethernet lmi ce
- ethernet lmi
- clear ethernet lmi statistics
- trace ethernet lmi
- show ethernet lmi

23.1 shutdown ethernet lmi

This command shutdowns the Ethernet local management interface (LMI) on the switch. The no form of this command Starts Ethernet LMI on the switch.

```
shutdown ethernet lmi
```

```
no shutdown ethernet lmi
```

Mode Global Configuration Mode

Package Metro and Enterprise

Example `iss(config)#shutdown ethernet lmi`



When ISS boots up, ELMI is not started by default.

23.2 ethernet lmi global

This command enables Ethernet local management interface (LMI) functionality on each port of the device. The no form of this command disables Ethernet local management interface (LMI) on ports on which LMI is enabled.

ethernet lmi global

no ethernet lmi global

Mode Global Configuration Mode

Package Metro and Enterprise

Example `iss(config)#ethernet lmi global`

Defaults ELMI is disabled globally.



- When ISS boots up, to make ELMI operational ELMI should be enabled on each port and globally too explicitly.

This command enables ELMI functionality globally on a device.

Related Commands **ethernet lmi interface** – This command is used to enable Ethernet local management interface (LMI) on a user-network interface (UNI).

23.3 ethernet lmi interface

This command Configures Ethernet LMI on the interface. If E-LMI is disabled globally, then this command wont enable ELMI on the interface. The no form of this command disables ELMI on the interface.

```
ethernet lmi interface
```

```
no ethernet lmi interface
```

Mode Interface configuration Mode

Package Metro and Enterprise

Defaults ELMI is disabled on the interface.

Example iss(config-if)#ethernet lmi interface

23.4 ethernet lmi ce

This command Configures the port as E-LMI Customer edge (CE) port. The no form of this command configures port as E-LMI provider edge port.

ethernet lmi ce

no ethernet lmi ce

Mode Interface configuration Mode

Package Metro and Enterprise

Defaults When ISS boots up the port comes up as Provider Edge (PE) port. Port should be configured explicitly as CE port using this command.

Example `iss(config-if)#ethernet lmi ce`



This command convert the mode of interface to Customer Edge.

23.5 ethernet lmi

This command sets Ethernet local management interface (LMI) parameters on an interface (UNI). The no form of this command sets the parameter values to default.

```
ethernet lmi {n391 <value (1-65000)>|n393 <value (2-10)>|t391 <value (5-30)>|t392
<value (0, 5-30)>}
```

```
no ethernet lmi {n391 | n393 | t391 | t392}
```

Syntax Description	n391	- Sets the Polling Counter Value for the specified interface. Polling Counter Value is the number of ELMI check enquiry messages after which an ELMI full status enquiry will be send. The range is 1 to 65000.The default value is 360.
	n393	- Sets the Status Counter value for the interface. It Counts number of consecutive abnormal expiry of Polling Timer at ELMI UNI-C side or consecutive abnormal expiry of Polling Verification Timer at ELMI UNI-N side. It is used to determine if E-LMI is operational or not. The range is 2 to 10.
	t391	- Sets the Polling Timer Value on the customer equipment. Polling timer starts whenever UNI-C transmits an Enquiry message and if the status message is not received within the timer expiry, records error. The range is 5 to 30.The default value is 10 sec.
	t392	- Sets the Polling Verification Timer Value on the Network equipment. PVT is started after transmitting the status message and stopped after receiving the status enquiry. The polling verification timer (t392) can be disabled by setting the value to ZERO.A very high value for the polling timer (t391) means more time spent detecting Ethernet LMI link-down errors. The polling verification timer checks that the status enquiries are received periodically. The timer expiry means that the status enquiry was not received in the time interval. On timer expiry, an error is recorded and the timer is restarted. The range is 5 to 30.The default value is 15 sec.

Mode Interface configuration

Package Metro and Enterprise

Defaults The value of n391 is 360.

The value of n393 is 4.

The value of t391 is 10 seconds.

The value of n392 is 15 seconds.

Example `iss(config-if)# ethernet lmi n391 20`

23.6 clear ethernet lmi statistics

This command will `reset` LMI statistics maintained for all interfaces or for a specific interface.

```
clear ethernet lmi statistics [interface <ifXtype> <ifnum>]
```

Mode Privileged EXEC Mode

Package Metro and Enterprise

Defaults No default is defined.

Example `iss# clear ethernet lmi statistics interface gigabitethernet
0/1`

23.7 trace ethernet lmi

This command enables ELMI trace messages for all ELMI enabled interfaces. The no form of this command disables trace messages.

```
trace ethernet lmi { initshut | management | datapath | controlplane |
packetdump | resources | allfailure | buffer | memory | events | timer | all }
```

```
no trace ethernet lmi { initshut | management | datapath | controlplane |
packetdump | resources | allfailure | buffer | memory | events | timer | all }
```

Syntax Description	initshut	-	Displays Init and Shutdown Traces
	management	-	Displays Management Traces
	datapath	-	Displays Data Path Traces
	controlplane	-	Displays Control Plane Traces
	packetdump	-	Displays Packet Dump Traces
	resources	-	Displays Traces related to All Resources except Buffers
	allfailure	-	Displays All Failure Traces
	buffer	-	Displays Buffer Traces
	memory	-	Displays Memory related Traces
	events	-	Displays Event Handling Traces
	timer	-	Displays Timer Module Traces
	all	-	Displays all Traces.

Mode Privileged EXEC Mode

Package Metro and Enterprise

Defaults Trace is Disabled

Example iss# trace ethernet lmi all

23.8 show ethernet lmi

This command displays any one or all of the following values depending upon the parameters provided.

- The configured ELMI parameters for a single interface
- The Statistics maintained for the interfaces

```
show ethernet lmi {{parameters|statistics} {interface <interface -type>
<ifnum>}}
```

Syntax Description	evc	- Displays information about an EVC.
	parameters interface <interface type > <ifnum>	- Displays Ethernet LMI parameters for the interface.
	statistics interface <interface type> <ifnum>	- Displays Ethernet LMI statistics for the interface.
Mode	Privileged EXEC Mode	

Package Metro and Enterprise

Example iss# show ethernet lmi parameters interface gigabitethernet 0/1

```
PORT IS IN CUSTOMER MODE
```

```
ELMI-PARAMETER For Interface Ethernet 0/1
```

```
Version      :- MEF-16
Mode         :- CE
t391         :- 10
t392         :- NE
N391         :- 360sec
N393         :- 4
```

23.9 show ethernet lmi status

This command displays the Ethernet Local management interface (LMI) information.

```
show ethernet lmi status [interface <interface-type> <ifnum>]
```

Syntax	interface type	-	Interface Type
Description	if num	-	Interface number

Mode Privileged EXEC Mode

Package Metro and Enterprise

Example iss# show ethernet lmi status interface gigabitethernet 0/1

```
ELMI Status      : Started, Enabled
```

```
-----  
interface gigabitethernet 0/1  
-----
```

```
ELMI Port Status      : Enabled  
ELMI UNI side         : UNI-C  
Pooling Timer         : 10 Sec  
Status Counter        : 4  
Pooling Counter:      : 360
```

Chapter

24

ELPS

ELPS (Ethernet Linear Protection Switching) module protects the data traffic in a Point-to-Point VLAN service path in the network upon failure of the active working path. ELPS module achieves rapid failure recovery in the order of milliseconds.

ELPS modules provides support for the following:

- provider 802.1ad bridges (S-VLANs) protection
- 1:1 bidirectional (with APS (Automatic Protection Switching) communication) architecture
- revertive and non-revertive operation modes
- multi-board environment
- High Availability

ELPS module is capable of running Multiple Instances of the protocol through the Multiple Instances feature and Switch Instance Shared Port feature.

The list of commands for the configuration of ELPS is as follows:

- shutdown aps
- aps enable
- aps group
- aps ingress
- aps monitor
- aps working meg
- aps protect meg
- aps group-name
- aps revert

ISS

- aps wait-to-restore
- aps timers
- aps hold-off
- aps working
- aps protect
- aps group active
- aps force
- aps manual
- aps lockout
- aps exercise
- aps clear
- aps freeze
- aps notification enable
- debug aps
- clear aps s
- show aps global info
- show aps
- show aps group list protection port

24.1 shutdown aps

This command shuts down Ethernet Linear Protection Switching functionality for a virtual context. The no form of the command starts Ethernet Linear Protection Switching functionality for a virtual context.

All the configurations related to the Ethernet Linear Protection Switching functionality are deleted for a virtual context, once the functionality is shutdown.

Memory will be reserved in the form of memory pools for the context, if the Ethernet Linear Protection Switching functionality is started for that context. All used memory will be released back to the memory pools, if the Ethernet Linear Protection Switching functionality is shut down for a context.

shutdown aps [linear]

no shutdown aps [linear]

Syntax Description	linear ⁴ - Ethernet Linear Protection Switching Functionality.
Mode	Switch configuration mode
Package	Metro
Defaults	Ethernet Linear Protection Switching functionality is shutdown for all virtual contexts.
Example	<code>iss(config-switch)# no shutdown aps linear</code>



Related Commands

Ethernet Linear Protection Switching functionality should be started for enabling the Ethernet Linear Protection Switching functionality and creating a protection group.

- **switch** - Creates virtual context.
- **aps enable** - Enables the Ethernet Linear Protection Switching functionality.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps notification enable** - Enables the sending of notification messages from Ethernet Linear Protection Switching to a remote management entity upon specific events.
- **debug aps** - Sets the debug level for the protection group in a specific virtual context or in all contexts.
- **show aps global info** - Displays the Ethernet Linear Protection Switching global information for a context or for all contexts.

⁴ Planned to provide support for Ethernet Ring Protection Switching functionality in future.

24.2 aps enable

This command enables the Ethernet Linear Protection Switching functionality. The no form of the command disables the Ethernet Linear Protection Switching functionality.

If the Ethernet Linear Protection Switching functionality is disabled, all the protection groups will become operationally non-functional, all the dynamic information for Protection group such as APS PDU Tx will be stopped, and APS PDU Rx and signal status indications will not be processed. The protection group configuration can be still done even if the Ethernet Linear Protection Switching functionality is disabled.

aps [linear] enable

no aps [linear] enable

Syntax Description	linear ⁴ - Ethernet Linear Protection Switching Functionality.
Mode	Switch configuration mode
Package	Metro
Defaults	Ethernet Linear Protection Switching functionality is disabled for all virtual contexts.
Example	iss(config-switch)# aps linear enable



Ethernet Linear Protection Switching functionality should be started in the virtual context, before executing this command.

Related Commands

- **switch** - Creates virtual context.
- **no shutdown aps** - Starts Ethernet Linear Protection Switching functionality in the virtual context and on all ports in the virtual context.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **aps freeze** - Freezes the state of the protection group.
- **show aps global info** - Displays the Ethernet Linear Protection Switching global information for a context or for all contexts.

24.3 aps group

This command creates a protection group (sub-network connection) and enters into the protection group configuration mode. If the protection group is already created, this command enters into the protection group configuration mode for that protection group.

The no form of the command deletes the protection group. If the protection group is deleted, the services protected by the group will not be protected upon a fault or signal failure.

aps [linear] group <group-number>

no aps [linear] group <group-number>

Syntax Description	linear⁴	- Ethernet Linear Protection Switching Functionality.
	group-number	- Unique identifier for the protection group. This value ranges between 0 and 4294967295.

Mode Switch configuration mode

Package Metro

Example `iss(config-switch)# aps linear group 10`



Ethernet Linear Protection Switching functionality should be started in the virtual context, before executing this command.

Related Commands

- **switch** - Creates virtual context.
- **no shutdown aps** - Starts Ethernet Linear Protection Switching functionality in the virtual context and on all ports in the virtual context.
- **aps ingress** - Configures the port through which the traffic ingresses for the working and protection transport services, into the protection domain.
- **aps monitor** - Configures the fault monitoring mechanism for the protection group.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the working path with the protection group.
- **aps protect meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the protection path with the protection group.
- **aps group-name** - Configures the name for the protection group.
- **aps revert** - Configures the operating mode of the protection group as revertive and sets the wait-to-restore time.
- **aps wait-to-restore** - Configures the wait-to-restore timer interval for the protection group in steps of 1 minute.

- **aps timers** - Configures the interval of the periodic timer and the hold-off timer for the protection group.
- **aps hold-off** - Configures the interval of the hold-off timer for the protection group in steps of 100 milliseconds.
- **aps working** - Configures the working interface, type of service that needs to be protected and the service(s) involved in the protection group.
- **aps protect** - Configures the protecting interface and the service(s) used to protect the working service(s) in the protection group.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **aps freeze** - Freezes the state of the protection group.
- **show aps** - Displays the protection group related information.

24.4 aps ingress

This command configures the port through which the traffic ingresses for the working and protection transport services, into the protection domain.

The ingress ports configured in end bridges define the boundary of the protection domain.

This command is an optional configuration for the protection group.

aps ingress <interface_type> <interface_id>

Syntax Description	interface_type	- Type of the interface. This can be: <ul style="list-style-type: none"> • GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second. • FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second.
	interface_id	- Identifier of the interface. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.

Mode Protection group configuration mode

Package Metro

Example `iss(config-switch-pg)# aps ingress gigabitethernet 0/1`



Related Commands

- The port should be mapped to the context, before executing this command.
- This command cannot be executed, if the protection group is activated.
- **map switch**- Maps the port to the Context.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.5 aps monitor

This command configures the fault monitoring mechanism for the protection group..



ELPS supports only Y1731 as a monitoring mechanism.

aps monitor {y1731}

Syntax **y1731**

Description

- The Interface Masters ECFM - Y.1731 specification from the ITU-T coupled with the Ethernet OAM, provides capabilities useful for detecting, verifying, isolating connectivity failures and performance monitoring in Virtual Bridged Local Area Networks. The fault detection, isolation and verification are done through Continuity Check, Loop Back and Link Trace protocols. Performance monitoring is done using Loss Measurement, Delay Measurement and throughput measurement functions

Mode Protection group configuration mode.

Package Metro

Defaults The fault monitoring mechanism is set as CFM (Connectivity Fault Management).

Example `iss(config-switch-pg)# aps monitor y1731`



**Related
Commands**

- The protection group can be activated only if the table containing the configurations related to the monitoring entities for each group, has an active entry for the group. This condition is applicable when the fault monitoring mechanism for the group is set as **y1731**.
- This command can be executed, only if the protection group is deactivated.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.6 aps working meg

This command associates the fault monitoring entities (Y.1731 specific entities) for the working path with the protection group.

aps working meg <meg-id> **me** <me-id> **mep** <mep-id(1-8191)>

Syntax Description	meg-id	- Identifier of the Maintenance Entity Group for the working entity of the protection group. This value ranges between 1 and 4294967295.
	me-id	- Identifier of the Maintenance Entity for the working entity of the protection group. This value ranges between 1 and 4294967295.
	mep-id	- Identifier of the Maintenance Entity Group End Point that monitors the working entity of the protection group. This value ranges between 1 and 8191.

Mode Protection group configuration mode

Package Metro

Defaults

meg-id	=	0
me-id	=	0
mep-id	=	0

Example iss(config-switch-pg)# aps working meg 1 me 2 mep 5



Related Commands

- This command cannot be executed, if the protection group is activated.
- The fault monitoring entities should be configured for the working path, before activating the protection group.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.7 aps protect meg

This command associates the fault monitoring entities (Y.1731 specific entities) for the protection path with the protection group.

```
aps protect meg <meg-id> me <me-id> mep <mep-id (1-8191)>
```

Syntax Description	meg-id	- Identifier of the Maintenance Entity Group for the protection entity of the protection group. This value ranges between 1 and 4294967295.
	me-id	- Identifier of the Maintenance Entity for the protection entity of the protection group. This value ranges between 1 and 4294967295.
	mep-id	- Identifier of the Maintenance Entity Group End Point that monitors the protection entity of the protection group. This value ranges between 1 and 8191.

Mode Protection group configuration mode

Package Metro

Defaults

meg-id	=	0
me-id	=	0
mep-id	=	0

Example iss(config-switch-pg)# aps protect meg 2 me 1 mep 3



Related Commands

- This command cannot be executed, if the protection group is activated.
- The fault monitoring entities should be configured for the protection path, before activating the protection group.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.8 aps group-name

This command configures the name for the protection group. The no form of the command resets the name of the protection group to the default value.

```
aps group-name <pg_name (32)>
```

```
no aps group-name
```

Syntax	pg_name	-	Name of the protection group. The size of the string ranges between 0 and 32.
Description			
Mode	Protection group configuration mode		
Package	Metro		
Defaults	pg_name	=	Null string
Example	iss(config-switch-pg)# aps group-name group1		
Related Commands	<ul style="list-style-type: none">• aps group - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.• show aps - Displays the protection group related information.		

24.9 aps revert

This command configures the operating mode of the protection group as revertive and optionally sets the wait-to-restore time. The normal traffic shifts back to the working entity from the protection entity when the existing fault on the working entity is cleared.

The no form of the command configures the operating mode of the protection group as non-revertive. The traffic continues to flow on the protection entity even after the fault on the working entity is cleared.

```
aps revert [[wait-to-restore] <interval(1-1000) in units of minutes>]
```

```
no aps revert
```

Syntax Description	wait-to-restore	-	The time after which the protection group switches back to the working entity. This value ranges between 1 and 1000 minutes.
---------------------------	------------------------	---	---

Mode	Protection group configuration mode
-------------	-------------------------------------

Package	Metro
----------------	-------

Defaults	Operating mode of the protection group is set as revertive.
-----------------	---

wait-to-restore	=	5 minutes
-----------------	---	-----------

Example	iss(config-switch-pg)# aps revert wait-to-restore 3
----------------	---



Related Commands

- The operating mode of the protection group can be changed, only if the protection group is deactivated.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps wait-to-restore** - Configures the wait-to-restore timer interval for the protection group in steps of 1 minute.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.10 **aps wait-to-restore**

This command configures the wait-to-restore timer interval for the protection group in steps of 1 minute. The no form of the command resets the wait-to-restore timer interval to the default value.

The protection group switches back to the working entity after the expiry of the wait-to-restore timer interval. The value of the interval ranges between 1 and 1000 minutes.

aps wait-to-restore <interval(1-1000) in units of minutes>

no aps wait-to-restore

Mode Protection group configuration mode

Package Metro

Defaults 5 minutes

Example `iss(config-switch-pg)# aps wait-to-restore 10`



- The configured wait-to-restore timer interval will be used, only if the protection group operates in revertive mode.
- The wait-to-restore timer interval can be configured, even if the protection group is activated.

Related Commands

- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps revert** - Configures the operating mode of the protection group as revertive.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.11 aps timers

This command configures the interval of the periodic timer and the hold-off timer for the protection group. The no form of the command resets the periodic and hold-off timers to the default value.

```
aps timers [periodic] <interval(1-1000) in units of seconds> [hold-off]
<interval(0-1000) in units of 100 milliseconds>
```

```
no aps timers
```

Syntax	periodic	-	Time interval for the periodic transmission of Automatic Protection Switching Protocol Data Units. This value ranges between 1 and 1000 seconds. This value is configured in steps of 1 second.
	hold-off	-	Time interval for: <ul style="list-style-type: none"> • a server layer protection mechanism to fix a problem before switching at client layer, or • an upstream protected domain to switch before a downstream domain. This value ranges between 0 and 1000 (that is, from 0 to 100000 milliseconds). This value is configured in steps of 100 milliseconds (That is, if configured as 1, it is internally assigned as 100 milliseconds).

Mode Protection group configuration mode

Package Metro

Defaults

periodic	=	5 seconds
hold-off	=	0 millisecond

Example iss(config-switch-pg)# aps timer periodic 10 hold-off 1



The periodic time interval can be configured, even if the protection group is activated.

Related Commands

- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.12 **aps hold-off**

This command configures the interval of the hold-off timer for the protection group in steps of 100 milliseconds. The no form of the command resets the hold-off timer to the default value.

The hold-off timer interval value ranges between 0 and 1000 (that is, from 0 to 100000 milliseconds).

aps hold-off <interval(0-1000) in units of 100 milliseconds>

no aps hold-off

Mode Protection group configuration mode

Package Metro

Defaults 0 millisecond

Example `iss(config-switch-pg)# aps hold-off 10`



The hold-off time interval can be configured, even if the protection group is activated.


**Related
Commands**

- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.13 aps working

This command configures the working interface, type of service that needs to be protected and the service(s) involved in the protection group.

```
aps working <interface_type> <interface_id> [{vlan}] {service <service_id> |
service-list <services_list(1,2,3-4)> | all}
```

Syntax	interface_type	- Type of interface. This can be: <ul style="list-style-type: none"> FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second. GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second.
	Description	
	interface_id	- Interface identifier. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.
	vlan	- Protection group protects only the VLAN service.
	service	- Unique identifier of the working service to be protected. This value ranges between, <ul style="list-style-type: none"> 1 and 4094 for VLAN service. 1 and 4294967295, for other service.  Only the VLAN service is supported.
	service-list	- List of working services to be protected by the protection group.
	all	- Protects all the working services flowing through the working port.
Mode	Protection group configuration mode	
Package	Metro	
Defaults	Service type is Vlan	
Example	<pre>iss(config-switch-pg)# aps working gigabitethernet 0/2 service 3</pre>	



- The list of services or all services is protected, only if the same set of services is used for both the working and protection entities.
- This command cannot be executed, if the protection group is activated.
- The working interface should be configured using this command, before activating the protection group and before configuring the protecting interface.


**Related
Commands**

- **map switch**- Maps the port to the Context.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.14 aps protect

This command configures the protecting interface and the service(s) used to protect the working service(s) in the protection group.

```
aps protect <interface_type> <interface_id> {service <service_id> | service-  
list <services_list(1,2,3-4)> | all}
```

Syntax	interface_type	- Type of interface. This can be:
	Description	<ul style="list-style-type: none"> • FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second. • GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second.
	interface_id	- Interface identifier. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.
	service	<ul style="list-style-type: none"> - Unique identifier of the protection service to be used for protection. <p>This value ranges between,</p> <ul style="list-style-type: none"> • 1 and 4094, for VLAN service. • 1 and 4294967295, for other service. <p> Only the VLAN service is supported.</p>
	service-list	- List of protection services to be used for protection.
	all	- All the protection services will be used for protecting the working services.
Mode	Protection group configuration mode	
Package	Metro	
Defaults	Service type is Vlan	
Example	<pre>iss(config-switch-pg)# aps protect gigabitethernet 0/3 service 1</pre>	



- The list of services or all services is used for protection, only if the same set of services is used for both the working and protection entities. Otherwise, this command will fail.
- This command cannot be executed, if the protection group is activated.
- The working interface should be configured, before executing this command.
- The protecting interface should be configured using this command, before activating the protection group.

**Related
Commands**

- **map switch**- Maps the port to the Context.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **no aps group active** - De-activates the protection mechanism for the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.
- **show aps group list protection port** - Displays the list of protection groups sharing the given protection port.

24.15 **aps group active**

This command activates the protection mechanism for the protection group. The no form of the command de-activates the protection mechanism for the protection group.

aps group active

no aps group active

Mode Protection group configuration mode

Package Metro

Defaults Protection mechanism is de-activated.

Example `iss(config-switch-pg)# aps group active`



- The fault monitoring entities should be configured for the working and protection paths, and the working and protecting interfaces should be configured, before activating the protection mechanism.
- The following can be modified only after de-activating the protection mechanism:
 1. Fault monitoring entities for the working and protection paths,
 2. Configuration of working and protecting interfaces,
 3. Port configured to pass the traffic ingresses,
 4. Configuration of operating mode of the protection group.

Related Commands

- **aps ingress** - Configures the port through which the traffic ingresses for the working and protection transport services, into the protection domain.
- **aps monitor** - Configures the fault monitoring mechanism for the protection group.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the working path with the protection group.
- **aps protect meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the protection path with the protection group.
- **aps revert** - Configures the operating mode of the protection group as revertive and sets the wait-to-restore time.
- **aps wait-to-restore** - Configures the wait-to-restore timer interval for the protection group in steps of 1 minute.
- **aps timers** - Configures the interval of the periodic timer and the hold-off timer for the protection group.
- **aps hold-off** - Configures the interval of the hold-off timer for the protection group in steps of 100 milliseconds.
- **aps working** - Configures the working interface, type of service that needs to be protected and the service(s) involved in the protection group.

- **aps protect** - Configures the protecting interface and the service(s) used to protect the working service(s) in the protection group.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **aps freeze** - Freezes the state of the protection group.
- **show aps** - Displays the protection group related information.

24.16 **aps force**

This command forces traffic signal to be selected from the protection transport entity. The Protection Transport Entity is the one that is allocated to transport the normal traffic signal during a switch event. The no form of the command clears the force switch on the protection group.

aps force

no aps force

Mode	Protection group configuration mode
Package	Metro
Defaults	Current state of the protection group will be No Request - Working Active request of the protection group will be Clear .
Example	<code>iss(config-switch-pg)# aps force</code>



- Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.
- The traffic signal can be forced using this command, only if the lockout on the protection group is cleared.
- This command and the no form of the command can be executed, only if the protection group state is not frozen.
- The force switch on the protection group can be cleared using the no form of the command, only if the currently active request for the protection group is **Forced Switch**.

Related Commands

- **aps enable** - Enables the Ethernet Linear Protection Switching functionality
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **no aps lockout** - Clears the lockout on the protection group.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **no aps freeze** - Unfreezes the state of the protection group (that is, clears the freeze).

- **clear aps s** - Clears the Ethernet Linear Protection Switching statistic counter of a protection group / all protection groups of a specific virtual context or all contexts.
- show aps** - Displays the protection group related information.

24.17 aps manual

This command configures the protection group to select the traffic signal from the protection transport entity. The no form of the command clears the manual switch on the protection group.

aps manual

no aps manual

Mode Protection group configuration mode

Package Metro

Defaults Current state of the protection group will be **No Request - Working**
Active request of the protection group will be **Clear**.

Example `iss(config-switch-pg)# aps manual`



- Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.
- The protection group can be configured to select the traffic signal, only if the lockout and force switch on the protection group are cleared.
- This command and the no form of the command can be executed, only if the protection group state is not frozen.
- The manual switch on the protection group can be cleared using the no form of the command, only if the currently active request for the protection group is **Manual Switch**.

Related Commands

- **aps enable** - Enables the Ethernet Linear Protection Switching functionality
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **no aps force** - Forces traffic signal to be selected from the protection transport entity
- **no aps lockout** - Clears the lockout on the protection group.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **no aps freeze** - Unfreezes the state of the protection group (that is, clears the freeze).
- **clear aps s** - Clears the Ethernet Linear Protection Switching statistic counter of a protection group / all protection groups of a specific virtual context or all contexts.
- **show aps** - Displays the protection group related information.

24.18 aps lockdown

This command prevents the working traffic signal from being selected from the protection transport entity. This command effectively disables the protection group. The no form of the command clears the lockdown on the protection group.

aps lockdown

no aps lockdown

Mode	Protection group configuration mode
Package	Metro
Defaults	Current state of the protection group will be No Request - Working Active request of the protection group will be Clear .
Example	<code>iss(config-switch-pg)# aps lockdown</code>



Related Commands

- Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.
- This command and the no form of the command can be executed, only if the protection group state is not frozen.
- The lockdown on the protection group can be cleared using the no form of the command, only if the currently active request for the protection group is **Lockout**.
- **aps enable** - Enables the Ethernet Linear Protection Switching functionality.
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockdown of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **no aps freeze** - Unfreezes the state of the protection group (that is, clears the freeze).
- **show aps** - Displays the protection group related information.

24.19 aps exercise

This command tests if the Automatic Protection Switching communication is operating correctly. The no form of the command clears the exercise signal on the protection group.

aps exercise

no aps exercise

Mode	Protection group configuration mode
Package	Metro
Defaults	Current state of the protection group will be No Request - Working Active request of the protection group will be Clear .
Example	<code>iss(config-switch-pg)# aps exercise</code>



Related Commands

- Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.
- The exercise signal can be set on the protection group, only if the force switch, manual switch and lockout on the protection group are cleared.
- This command and the no form of the command can be executed, only if the protection group state is not frozen.
- The exercise signal on the protection group can be cleared using the no form of the command, only if the currently active request for the protection group is **Exercise**.
- **aps enable** - Enables the Ethernet Linear Protection Switching functionality
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps group active** - Activates the protection mechanism for the protection group.
- **no aps force** - Forces traffic signal to be selected from the protection transport entity
- **no aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **no aps lockout** - Clears the lockout on the protection group.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **no aps freeze** - Unfreezes the state of the protection group (that is, clears the freeze).
- **clear aps s** - Clears the Ethernet Linear Protection Switching statistic counter of a protection group / all protection groups of a specific virtual context or all contexts.
- **show aps** - Displays the protection group related information.

24.20 aps clear

This command clears the following **Current state** of the protection group:

- **LockOut of Protection**
- **Forced Switch**
- **Manual Switch**
- **Exercise - Working**
- **Wait to Restore**

aps clear

Mode	Protection group configuration mode
Package	Metro
Defaults	Current state of the protection group will be No Request - Working Active request of the protection group will be Clear .
Example	<code>iss(config-switch-pg)# aps clear</code>



Related Commands

- Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.
- This command and the no form of the command can be executed, only if the protection group state is not frozen.
- **aps enable** - Enables the Ethernet Linear Protection Switching functionality
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps wait-to-restore** - Configures the wait-to-restore timer interval for the protection group in steps of 1 minute.
- **aps group active** - Activates the protection mechanism for the protection group.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **no aps freeze** - Unfreezes the state of the protection group (that is, clears the freeze).
- **show aps** - Displays the protection group related information.

24.21 **aps freeze**

This command freezes the state of the protection group. The no form of the command clears the **Freeze** state of the protection group.

All external commands will be rejected and the condition changes and received Automatic Protection Switching information will be ignored, once the state of the protection group is frozen.

The available external commands are:

- **aps force**
- **aps manual**
- **aps lockout**
- **aps exercise**
- **aps clear**

The freeze state of the protection group will not be saved and restored, after a configuration save and restore operation.

State of the protection group will be recomputed based on the condition changes and Automatic Protection Switching information received, once the freeze state is cleared.

aps freeze

no aps freeze

Mode	Protection group configuration mode
Package	Metro
Defaults	The state of the protection group is not frozen (that is, all the external commands can be executed).
Example	<code>iss(config-switch-pg)# aps freeze</code>



Related Commands

Ethernet Linear Protection Switching functionality should be enabled, and protection group should be activated, before executing this command.

- **aps enable** - Enables the Ethernet Linear Protection Switching functionality
- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.

- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **show aps** - Displays the protection group related information.

24.22 **aps notification enable**

This command enables the sending of notification messages from Ethernet Linear Protection Switching to a remote management entity upon specific events. The no form of the command disables the sending of notification messages to the remote management entity.

aps [linear] notification enable

no aps [linear] notification enable

Syntax Description **linear**⁴ - Ethernet Linear Protection Switching Functionality.

Mode Global configuration mode

Package Metro

Defaults Sending notification messages to a remote management entity is enabled.

Example `iss(config-switch)# no aps linear notification enable`



Ethernet Linear Protection Switching functionality should be started in the virtual context, before executing this command.

Related Commands

- **switch** - Creates virtual context.
- **no shutdown aps** - Starts Ethernet Linear Protection Switching functionality in the virtual context and on all ports in the virtual context.
- **show aps global info** - Displays the Ethernet Linear Protection Switching global information for a context or for all contexts.


24.23 debug aps

This command sets the debug level for the protection group in a specific virtual context or in all contexts. This command displays the currently enabled debug levels, if executed without any option or only with the option **linear**. The no form of the command resets the debug level for the protection group.

```
debug aps [linear] [{global | [all] [critical] [init-shut] [mgmt] [ctrl] [pkt-dump] [resource] [all-fail] [buff] [switch <context_name>]}]
```

```
no debug aps [linear] [{global | [all] [critical] [init-shut] [mgmt] [ctrl] [pkt-dump] [resource] [all-fail] [buff] [switch <context_name>]}]
```

Syntax Description	linear ⁴	- Ethernet Linear Protection Switching Functionality.
	global	- Global traces which are not context specific. For example: <ul style="list-style-type: none"> • Traces present in the Task Initialization • Traces present during context creation • Any trace statements before identifying the virtual context in Application Programming Interfaces
	all	- All traces.
	critical	- Ethernet Linear Protection Switching critical traces. These traces are used for cases such as failure of RBTtree addition, failure to program the hardware, and so on.
	init-shut	- Start and shutdown traces. These traces are used during the module initialization and shutdown. These traces are used for cases such as failure of RBTtree creation and so on.
	mgmt	- Management traces.
	ctrl	- Control plane traces. These traces are used for cases such as MBSM card removal, failure of state change and so on.

	pkt-dump	- Packet dump traces. These traces are used during the reception and transmission of packets.
	resource	- Traces related to all resources such as memory, data structure and the like. These traces are used for failure of memory allocation and so on.
	all-fail	- All failure traces. These traces are used for all valid and invalid failures. The valid failures represent the expected error. The invalid failures represent the unexpected error.
	buff	- Buffer allocation / release traces.
	switch	- Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.
Mode	Privileged Exec Mode / User Exec Mode	
Package	Metro	
Defaults	critical	
Example	iss# debug aps linear mgmt switch default	
	Ethernet Linear Protection Switching functionality should be started in the virtual context, before executing this command.	
Related Commands	<ul style="list-style-type: none"> • switch - Creates virtual context. • no shutdown aps - Starts Ethernet Linear Protection Switching functionality in the virtual context and on all ports in the virtual context. 	

24.24 clear aps statistics

This command clears the Ethernet Linear Protection Switching statistic counter of a protection group / all protection groups of a specific virtual context or all contexts.

```
clear aps [linear] statistics [group <group-number>] [switch <context_name>]
```

Syntax Description	linear ⁴	- Ethernet Linear Protection Switching Functionality.
	group	- Unique identifier for the protection group.
	switch	- Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.
Mode	Privileged Exec Mode / User Exec Mode	
Package	Metro	
Example	iss# clear aps linear statistics	
Related Commands	<ul style="list-style-type: none">• aps force - Forces traffic signal to be selected from the protection transport entity.• aps manual - Configures the protection group to select the traffic signal from the protection transport entity.• aps exercise - Tests if the Automatic Protection Switching communication is operating correctly.• show aps - Displays the protection group related information.	

24.25 show aps global info

This command displays the Ethernet Linear Protection Switching global information for a context or for all contexts.

```
show aps [linear] global info [switch <context_name>]
```

Syntax	linear ⁴	- Ethernet Linear Protection Switching Functionality.
	switch	- Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.
Description		
Mode	Privileged Exec Mode / User Exec Mode	
Package	Metro	
Example	<pre>iss# show aps linear global info Switch default ELPS Global Info ----- Module Status : Enabled Trap Status : Enabled</pre>	
Related Commands	<ul style="list-style-type: none"> • shutdown aps - Shuts down Ethernet Linear Protection Switching functionality in the virtual context and on all ports in the virtual context. • aps enable - Enables the Ethernet Linear Protection Switching functionality. • aps notification enable - Enables the sending of notification messages from Ethernet Linear Protection Switching to a remote management entity upon specific events. 	

24.26 show aps

This command displays the protection group specific information.

```
show aps [linear] [group <group-number>] [{configuration | status | statistics
| timers | working-entity | protection-entity}] [switch <context_name>]
```

Syntax Description

linear ⁴	- Ethernet Linear Protection Switching Functionality.
group	- Unique identifier for the protection group.
configuration	- Displays configuration (such as protection type, service type, monitor mechanism, and so on) of the protection groups in the virtual contexts.
status	- Displays current status (such as current state, last local command, last command status, active request and so on) of the protection group.
statistics	- Displays statistics information (such as count of auto-protection switches, forced switches and manual switched) for each of the protection groups.
timers	- Displays timer related information (such as intervals of hold-off, wait-to-restore and periodic timers) for each of the protection groups.
working-entity	- Displays configuration (such as working service identifier, working port identifier, working Maintenance Entity and so on) of working entity for each of the protection groups.
protection-entity	- Displays configuration (such as protection port identifier, protection service identifier protection Maintenance Entity and so on) of protection entity for each of the protection groups.
switch	- Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.

Mode Privileged Exec Mode / User Exec Mode

Package Metro

Example iss# show aps linear

```
Switch default
```

```
Protection Group Id    10
Protection Group Name  group1
Protection Group Configurations
-----
Protection Type        : 1:1 Bi-Directional with APS Channel
Config Type           : Individual
Service Type          : Vlan
Monitor Mechanism      : CFM
Operation Type         : Revertive
Ingress Port Id       : Gi0/1
```

```
Protection Group Id    10
Protection Group Name  group1
Protection Group Status
-----
Current state          : Manual Switch
Last Local Cmd         : Manual-Switch
Last Cmd Status        : Accepted
Last Local Condition   : Working Recovers from SF
Last Cond Status       : Not Applicable
Last Far End Req       : NR on Working
Last Far End Status    : Not Applicable
Active Request         : [Local Request] Manual Switch
Status                 : Active-Protection Path
```

```
Protection Group Id    10
Protection Group Name  group1
Protection Group Statistics
-----
```

```
Auto-Protection Switches Count : 2
Forced-Switches Count          : 1
Manual Switches Count          : 2
```

```
Protection Group Id    10
Protection Group Name  group1
Protection Group Timer Info
-----
Hold-Off Timer Interval : 100 milliseconds
WTR Timer Interval      : 10 minutes
APS Tx Interval         : 10 seconds
```

```
Protection Group Id    10
Protection Group Name  group1
```

Protection Group Working Entity

```

-----
Working Port Id      : Gi0/2
Working Service Id   : 3
Working MEG          : 1
Working ME           : 2
Working MEP          : 5

```

```

Protection Group Id   10
Protection Group Name group1
Protection Group Protection Entity

```

```

-----
Protection Port Id      : Gi0/3
Protection Service Id   : 1
Protection MEG          : 2
Protection ME           : 1
Protection MEP          : 3

```

```

iss# show aps linear configuration

```

```

Switch default

```

```

Protection Group Id   10
Protection Group Name group1
Protection Group Configurations

```

```

-----
Protection Type       : 1:1 Bi-Directional with APS Channel
Config Type          : Individual
Service Type         : Vlan
Monitor Mechanism     : CFM
Operation Type        : Revertive
Ingress Port Id      : Gi0/1

```

```

iss# show aps linear status

```

```

Switch default

```

```

Protection Group Id   10
Protection Group Name group1
Protection Group Status

```

```

-----
Current state         : Manual Switch
Last Local Cmd        : Manual-Switch
Last Cmd Status       : Accepted
Last Local Condition  : Working Recovers from SF
Last Cond Status      : Not Applicable
Last Far End Req      : NR on Working
Last Far End Status   : Not Applicable
Active Request        : [Local Request] Manual Switch
Status                : Active-Protection Path

```

```

iss# show aps linear statistics

```

```

Switch default

```

```

Protection Group Id   10

```

```

Protection Group Name group1
Protection Group Statistics
-----
Auto-Protection Switches Count : 2
Forced-Switches Count          : 1
Manual Switches Count          : 2

iss# show aps linear timers

Switch default

Protection Group Id    10
Protection Group Name group1
Protection Group Timer Info
-----
Hold-Off Timer Interval : 100 milliseconds
WTR Timer Interval      : 10 minutes
APS Tx Interval         : 10 seconds

iss# show aps linear working-entity

Switch default

Protection Group Id    10
Protection Group Name group1
Protection Group Working Entity
-----
Working Port Id        : Gi0/2
Working Service Id     : 3
Working MEG            : 1
Working ME             : 2
Working MEP            : 5

iss# show aps linear protection-entity

Switch default

Protection Group Id    10
Protection Group Name group1
Protection Group Protection Entity
-----
Protection Port Id     : Gi0/3
Protection Service Id  : 1
Protection MEG         : 2
Protection ME          : 1
Protection MEP         : 3

```

**Related
Commands**

- **aps group** - Creates a protection group (sub-network connection) and enters into the protection group configuration mode.
- **aps ingress** - Configures the port through which the traffic ingresses for the working and protection transport services, into the protection domain.
- **aps monitor** - Configures the fault monitoring mechanism for the protection group.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the working path with the protection group.

- **aps protect meg** - Associates the fault monitoring entities (Y.1731 specific entities) for the protection path with the protection group.
- **aps group-name** - Configures the name for the protection group.
- **aps revert** - Configures the operating mode of the protection group as revertive and sets the wait-to-restore time.
- **aps wait-to-restore** - Configures the wait-to-restore timer interval for the protection group in steps of 1 minute.
- **aps timers** - Configures the interval of the periodic timer and the hold-off timer for the protection group.
- **aps hold-off** - Configures the interval of the hold-off timer for the protection group in steps of 100 milliseconds.
- **aps working** - Configures the working interface, type of service that needs to be protected and the service(s) involved in the protection group.
- **aps protect** - Configures the protecting interface and the service(s) used to protect the working service(s) in the protection group.
- **aps group active** - Activates the protection mechanism for the protection group.
- **aps force** - Forces traffic signal to be selected from the protection transport entity.
- **aps manual** - Configures the protection group to select the traffic signal from the protection transport entity.
- **aps lockout** - Prevents the working traffic signal from being selected from the protection transport entity.
- **aps exercise** - Tests if the Automatic Protection Switching communication is operating correctly.
- **aps clear** - Clears the active lockout of protection, force switch, manual switch, wait-to-restore state or exercise command on the protection group.
- **aps freeze** - Freezes the state of the protection group.
- **clear aps s** - Clears the Ethernet Linear Protection Switching statistic counter of a protection group / all protection groups of a specific virtual context or all contexts.

24.27 show aps group list protection port

This command displays the list of protection groups sharing the given protection port, and the active status of the groups.

```
show aps [linear] group-list protection port <interface_type> <interface_id>
```

Syntax Description	linear ⁴	- Ethernet Linear Protection Switching Functionality.
	interface_type	- Type of the interface. This can be: <ul style="list-style-type: none"> GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second. FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second.
	interface_id	- Identifier of the interface. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.
Mode	Privileged Exec Mode / User Exec Mode	
Package	Metro	
Example	<pre>iss# show aps linear group-list protection port gigabitetherthet 0/3</pre> <pre>Protection Group Share Info ----- Protection Port PG Id PG Name Status Gi0/3 10 group1 Active-Protection</pre>	
Related Commands	aps protect - Configures the protecting interface and the service(s) used to protect the working service(s) in the protection group.	

Chapter

25

ERPS

ERPS (Ethernet Ring Protection Switching) is a portable software implementation that conforms to the ITU-T Standard G.8032/Y.1344 (06/2008) and its amendment ITU-T Standard G.8032/Y.1344 Amendment 1 (04/2009). The ERPS module ensures that there are no loops formed at the Ethernet layer.

ERPS modules provides support for the following:

- Forced switch and Manual switch
- Revertive and Non-revertive mode of operation
- Multi-board environment

The list of commands for the configuration of ERPS is as follows:

- shutdown aps ring
- aps ring enable
- aps ring group
- aps group name
- aps ring notification
- clear aps ring statistics
- debug aps ring
- aps group active
- aps working
- aps protect

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- aps working meg
- aps - force | manual
- aps revert
- aps timers
- aps propagate-tc
- show aps ring global info
- show aps ring

25.1 shutdown aps ring

This command shuts down the ERPS functionality in the virtual switch. The no form of the command starts the ERPS functionality in the virtual switch.

When the ERPS functionality is started, ERPS module is started in the context and the module status is initialized to **disable**. When the ERPS functionality is shutdown (without the switch string), ERPS module is shutdown in the context and all the ring configurations in the context are deleted. When the command is used with the switch string, then the ERPS context information in the switch will also be deleted.

shutdown aps ring [switch]

no shutdown aps ring

Syntax	switch	-	Context name for the virtual context.
Description			This is a string of size 32.

Mode	Switch configuration mode
-------------	---------------------------

Defaults	ERPS functionality is shutdown.
-----------------	---------------------------------

Example	iss(config-switch)# no shutdown aps ring
	iss(config-switch)# shutdown aps ring
	iss(config-switch)# shutdown aps ring switch



ERPS should be started for enabling the ERPS functionality.

Related Commands	<ul style="list-style-type: none"> • switch - Creates a virtual context. • aps ring enable - Enables the ERPS functionality. • show aps ring global info - Displays the ERPS global information for a context.
-------------------------	--

25.2 aps ring enable

This command enables the ERPS functionality. The no form of the command disables the ERPS functionality.

When the ERPS functionality is enabled, ERPS module is enabled in the context and ERPS protocol starts running on all the rings configured in the context. When the ERPS functionality is disabled, ERPS module is disabled in the context and all the rings configured in the context become non-operational, that is, ERPS protocol does not run on the rings in the context.

aps ring enable

no aps ring enable

Mode Switch Configuration mode

Defaults ERPS functionality is disabled for all virtual contexts.

Example `iss(config-switch)# aps ring enable`



ERPS functionality should be started in the virtual context, before executing this command.

**Related
Commands**

- **switch** - Creates a virtual context.
- **no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.
- **show aps ring global info** - Displays the ERPS global information for a context.

25.3 aps ring group

This command creates a ring entry in the ERPS and enters into the ring group configuration mode. The newly created ring entries will be in inactive state. If the ring entry is already created, this command enters into the ring group configuration mode for that ring entry.

All the ring group specific configurations are done in the ring group mode. These configurations include making the ring active, configuring the ring ports and R-APS VLAN ID for the ring and so on.

The no form of the command deletes an already created ring entry. If the ring entry is not present, an error message **Ring Entry is not present** is displayed.

```
aps ring group <group-id>
```

```
no aps ring group <group_id>
```

Syntax	group-id	- Unique numeric identifier of a ring within the context.
Description		

Mode	Switch Configuration mode
-------------	---------------------------

Example	<pre>iss(config-switch)# aps ring group 1 iss(config-switch-ring)#</pre>
----------------	--

```
iss(config-switch)# no aps ring group 1
```



ERPS functionality should be started in the virtual context, before executing this command.

Related Commands

- **switch** - Creates a virtual context.
- **no shutdown aps ring** - Starts ERPS functionality in the virtual switch.
- **show aps ring** - Displays the protection ring group related information.
- **aps group active** - Activates the given ring group.
- **aps working** - Configures the ring ports and R-APS VLAN ID for the ring.
- **aps protect** - Configures the given port as RPL port for the ring group and by this the ring node becomes the RPL owner.
- **aps blockport-on-virtualchannel-recovery** - Allows blocking of subring port to avoid temporary loop in the subring, when the virtual channel of subring recovers.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific) for each of the ring ports.
- **aps - force | manual** - Applies the force/manual switch for the ring on the given ring port.

- **aps revert** - Sets the operating mode of the ring group to revertive and sets the timer duration of wait-to-restore timer.
- **aps timers** - Configures the interval of the periodic timer, the hold-off timer and the guard timer.
- **aps propagate-tc** - Configures the propagate TC flag for the ring and configures the IDs of rings, for which the TC should be propagated.

25.4 aps group name

This command creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.

The newly created ring entries will be in inactive state. If the ring entry is already created, this command configures the ring name and enters into the ring group configuration mode for that ring entry.

All the ring group specific configurations are done in the ring group mode. These configurations include making the ring active, configuring the ring ports and R-APS VLAN ID for the ring and so on.

aps group name <group_name> ring group <group_id>

Syntax	group_name	- Indicates the name of the ring.
Description	group-id	- Unique numeric identifier of a ring within the context.

Mode Switch Configuration mode

Defaults The group name will be constructed by appending ring ID to the string **ring**.
For example, group name for a ring with ID as 1 will be **ring1**.

Example

```
iss(config-switch)# aps group name test ring group 1
iss(config-switch-ring)#
```



ERPS functionality should be started in the virtual context, before executing this command.

Related Commands	<ul style="list-style-type: none"> • switch - Creates a virtual context. • no shutdown aps ring - Starts the ERPS functionality in the virtual switch. • show aps ring - Displays the protection ring group related information. • aps group active - Activates the given ring group. • aps working - Configures the ring ports and R-APS VLAN ID for the ring. • aps protect - Configures the given port as RPL port for the ring group and by this the ring node becomes the RPL owner. • aps working meg - Associates the fault monitoring entities (Y.1731 specific) for each of the ring ports. • aps - force manual - Applies the force/manual switch for the ring on the given ring port. • aps revert - Sets the operating mode of the ring group to revertive and sets the timer duration of wait-to-restore timer. • aps timers - Configures the interval of the periodic timer, the hold-off timer and
-------------------------	---

the guard timer.

- **aps propagate-tc** - Configures the propagate TC flag for the ring and configures the IDs of rings, for which the TC should be propagated.

25.5 aps ring notification

This command enables the sending of trap notification messages from ERPS to a remote management entity upon specific events. The no form of the command disables the sending of trap notification messages from ERPS to a remote management entity upon specific events.

aps ring notification enable

no aps ring notification enable

Mode Switch Configuration mode

Defaults Trap notification is disabled.

Example `iss(config-switch)# aps ring notification enable`



ERPS functionality should be started in the virtual context, before executing this command.

**Related
Commands**

- **switch** - Creates a virtual context.
- **no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.
- **show aps ring global info** - Displays the ERPS global information for a context.

25.6 clear aps ring statistics

This command clears the statistic counters for the given ring. If the ring ID is not given, this command clears the statistics for all the rings in the context.

```
clear aps ring statistics [ring group <group-id>]
```

Syntax	group-id	-	Unique numeric identifier of a ring within the context.
Description			

Mode	Switch Configuration mode
-------------	---------------------------

Example	iss(config-switch)# clear aps ring statistics ring group 1
----------------	--

Related Commands	show aps ring statistics - Displays the ring statistics.
-------------------------	---

25.7 debug aps ring

This command sets the debug level. The no form of the command resets the debug level.

When the commands **debug aps ring** or **no debug aps ring** are executed without any of the optional parameters, it displays the traces enabled in the switches.

```
debug aps ring {[all] [critical] [start-shut] [mgmt] [ctrl] [pkt-dump]
[resource] [all-fail] [buff] [switch <string (32)>]}
```

```
no debug aps ring {[all] [critical] [start-shut] [mgmt] [ctrl] [pkt-dump]
[resource] [all-fail] [buff] [switch <string (32)>]}
```

Syntax Description	all	-	All traces.
	critical	-	Critical traces. These traces are used for cases such as failure of RBTREE addition, failure to program the hardware, and so on.
	init-shut	-	Start and shutdown traces. These traces are used during the module initialization and shutdown. These traces are used for cases such as failure of RBTREE creation and so on.
	mgmt	-	Management traces.
	ctrl	-	Control plane traces. These traces are used for cases such as MBSM card removal, failure of state change and so on.
	pkt-dump	-	Packet dump traces. These traces are used during the reception and transmission of packets.
	resource	-	Traces related to all resources such as memory, data structure and the like. These traces are used for failure of memory allocation and so on.
	all-fail	-	All failure traces. These traces are used for all valid and invalid failures. The valid failures represent the expected error. The invalid failures represent the unexpected error.

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	buff	-	Buffer allocation / release traces.
	switch	-	Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.
Mode	Privileged Exec Mode / User Exec Mode		
Defaults	critical		
Example	iss# debug aps ring mgmt switch default		
Related Commands	<ul style="list-style-type: none"> • switch - Creates a virtual context. • no shutdown aps ring - Starts the ERPS functionality in the virtual switch. 		

25.8 aps group active

This command activates the given ring group. The no form of the command de-activates the given ring group.

The ring group is created using the commands **aps ring group** or **aps group name**.

aps group active

no aps group active

Mode Ring Group Configuration mode

Defaults The ring group is inactive.

Example `iss(config-switch-ring)# aps group active`



- Ring port, R-APS VLAN and CFM entries should be configured before activating the ring group.

Related Commands

- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
- **aps working** - Configures the ring ports and R-APS VLAN ID for the ring.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific) for each of the ring ports.
- **aps - force | manual** - Applies the force/manual switch for the ring on the given ring port.
- **show aps ring** - Displays the protection ring group related information.

25.9 aps working

This command configures the ring ports and R-APS (Ring-Automatic Protection Switching) VLAN ID for the ring.

```
aps working <interface_type> <interface_id> [<interface_type> <interface_id>]
vlan <vlan_id>
```

Syntax Description

interface_type

- Type of interface. This can be:
 - FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second.
 - GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second.
 - Port-channel - Logical interface to identify the ports that are aggregated to increase the speed.

interface_id

- Interface identifier. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.

vlan_id

- VLAN identifier used by the ring for R-APS messages communication. This value ranges between 1 and 4094.

Mode

Ring Group Configuration mode

Defaults

Ring Ports

- 0, 0

R-APS VLAN ID

- 0

Example

```
iss(config-switch-ring)# aps working gigabitethernet 0/1 vlan 1
```



- The bridge mode should be configured for the switch.
- Ring ports and R-APS VLAN should be configured for activating the ring group.
- The ring ports must be associated with the switch.
- The second ring port is not configured for sub-rings, that is, the second port is 0.

Related Commands

- **map switch**- Maps the port to a context.
- **bridge-mode** - Configures the bridge to operate on customer or provider

network.

- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
- **aps group active** - Activates the given ring group.
- **show aps ring configuration** - Displays the protection ring group related information.

25.10 aps protect

This command configures the given port as RPL (Ring Protection Link) port for the ring group and the ring node becomes the RPL owner. The no form of the command configures the given port as non-RPL port from the ring. If the given port is earlier configured as RPL port, then the node becomes non-RPL owner for this ring.

aps protect <interface_type> <interface_id>

no aps protect

Syntax Description

interface_type

- Type of interface. This can be:

- FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second.
- GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second.
- Port-channel - Logical interface to identify the ports that are aggregated to increase the speed.

interface_id

- Interface identifier. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.

Mode

Ring Group Configuration mode

Defaults

RPL Port - 0

Example

```
iss(config-switch-ring)# aps protect gigabitethernet 0/1
```



The port configured as RPL should be one among the configured ring ports.

Related Commands

- **map switch-** Maps the port to a context.
- **bridge-mode** - Configures the bridge to operate on customer or provider network
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
- **aps working** - Configures the ring ports and R-APS VLAN ID for the ring.
- **show aps ring configuration** - Displays the protection ring group related information.

25.11 **aps blockport-on-virtualchannel-recovery**

This command allows blocking of sub-ring port to avoid temporary loop in the sub-ring, when the virtual channel of sub-ring recovers.

The no form of the command disables blocking of sub-ring port, when virtual channel of sub-ring recovers.

aps blockport-on-virtualchannel-recovery

no aps blockport-on-virtualchannel-recovery

Mode Ring Group Configuration mode

Defaults Blocking of sub-ring port is disabled.

Example `iss(config-switch-ring)# aps blockport-on-virtualchannel-recovery`



- The blocking of subring port should be enabled only on one of the interconnected nodes of a subring. The subring will be temporarily cutoff from the rest of network, if blocking is allowed on both of the interconnected nodes.

**Related
Commands**

- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **show aps ring** - Displays the protection ring group related information.

25.12 aps working meg

This command associates the fault monitoring entities (Y.1731 specific) for each of the ring ports.

```
aps working meg <meg-id(1-4294967295)> me <me-id(1-4294967295)> mep <mep-id(1-8191)> meg <meg-id(1-4294967295)> me <me-id(1-4294967295)> mep <mep-id(1-8191)>
```

Syntax Description	meg-id	- Identifier of the Maintenance Entity Group for the working entity of the ring group. This value ranges between 1 and 4294967295.
	me-id	- Identifier of the Maintenance Entity for the working entity of the ring group. This value ranges between 1 and 4294967295.
	mep-id	- Identifier of the Maintenance Entity Group End Point that monitors the working entity of the ring group. This value ranges between 1 and 8191.

Mode Ring Group Configuration mode

Defaults	meg-id	= 0
	me-id	= 0
	mep-id	= 0

Example

```
iss(config-switch-ring)# aps working meg 1 me 2 mep 5 meg 7 me 9 mep 15
```



CFM entries should be configured for activating the ring group.

- Related Commands**
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
 - **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
 - **show aps ring configuration** - Displays the protection ring group related information.

25.13 aps - force | manual

This command applies the force/manual switch for the ring on the given ring port. The no form of the command clears the force / manual switch for the given ring.

```
aps {force | manual} <interface-type> <interface-id>
```

```
no aps {force | manual}
```

Syntax Description	force	- Applies the force switch for the ring and blocks the port.
	manual	- Applies the manual switch for the ring and blocks the port.
	interface_type	- Type of interface. This can be: <ul style="list-style-type: none"> • FastEthernet - Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture which supports data transfer of 100 Megabits per second. • GigabitEthernet - A version of LAN standard architecture which supports data transfer of 1 Gigabit per second.
	interface_id	- Interface identifier. This is a combination of both slot number and port number separated by a front slash. Example: 1 / 4.

Mode Ring Group Configuration mode

Defaults None

Example `iss(config-switch-ring)# aps force gigabitethernet 0/1`



- ERPS functionality should be enabled, and the ring should be activated, before executing this command.
- Manual switch cannot be configured, if a link failure is present in the ring. Failure of the link in the ring clears the manual switch.
- Force switch is of higher priority than the manual switch. Force switch will overwrite the manual switch configuration. Similarly, manual switch cannot be configured, when force switch is configured.

Related Commands

- **no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.
- **aps ring enable** - Enables the ERPS functionality.
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.

- **aps group active** - Activates the given ring group.
- **show aps ring** - Displays the protection ring group related information.

25.14 aps revert

This command sets the operating mode of the ring group to revertive and sets the timer duration of wait-to-restore timer.

The no form of the command resets the operating mode of the ring to non-revertive mode. When the manual option is given, then manual recovery method is configured.

```
aps revert [wtr] <timer_value> [{milliseconds | seconds | minutes | hours}]
```

```
no aps revert [manual]
```

Syntax Description	wtr <timer_value>	-	The time after which the protection group switches back to the working entity. This value ranges between 0 and 86400000 milliseconds.
---------------------------	--------------------------------	---	--

manual	-	Manual recovery method of operation. When the link recovers, link ports will remain in the blocked state until manual method is changed to auto by the administrator.
---------------	---	--

Mode	Ring Group Configuration mode
-------------	-------------------------------

Defaults	Operating mode of the protection group is set as revertive.
-----------------	---

wtr	=	300000 milliseconds
------------	---	---------------------

Example	iss(config-switch-ring)# aps revert wtr 3 milliseconds
----------------	--



ERPS functionality should be started in the virtual context, before executing this command.

- | | |
|-------------------------|--|
| Related Commands | <ul style="list-style-type: none"> • no shutdown aps ring - Starts the ERPS functionality in the virtual switch. • aps ring group - Creates a ring entry in the ERPS and enters into the ring group configuration mode. • aps group name - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode. • show aps ring - Displays the protection ring group related information. |
|-------------------------|--|

25.15 aps timers

This command configures the interval of the periodic timer, the hold-off timer and the guard timer.

```
aps timers [periodic] <integer> [{milliseconds | seconds | minutes | hours}]
[hold-off] <integer> [{milliseconds | seconds | minutes | hours}] [guard]
<integer> [{milliseconds | seconds | minutes | hours}]
```

Syntax Description	periodic	- Time interval for the periodic transmission of Ring Automatic Protection Switching Protocol Data Units. This value ranges between 1 and 3600000 milliseconds.
	hold-off	- Time interval for: <ul style="list-style-type: none"> a server layer protection mechanism to fix a problem before switching at client layer, or an upstream protected domain to switch before a downstream domain. This value ranges between 0 and 3600000 milliseconds.
	guard	- Time interval to prevent reception of outdated R-APS messages. This value ranges between 0 and 3600000 milliseconds.

Mode Ring Group Configuration mode

Defaults	periodic	= 5000 milliseconds
	hold-off	= 0 millisecond
	guard	= 500 milliseconds

Example

```
iss(config-switch-ring)# aps timer periodic 10 hold-off 1
guard 15

iss(config-switch-ring)# aps timers periodic 10 milliseconds
hold-off 20 minutes guard 50 seconds
```



ERPS functionality should be started in the virtual context, before executing this command.

Related

- no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.

- Commands**
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
 - **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
 - **show aps ring timers** - Displays the protection ring group related information.

25.16 **aps propagate-tc**

This command configures the propagate TC (Topology Change) flag for the ring and configures the IDs of rings, for which the TC should be propagated. The no form of the command removes the configured TC list for the rings.

```
aps propagate-tc {[status {enable | disable}]} [ring-ids < ringid-range>]
no aps propagate-tc [ring-ids <ringid-range>]
```

Syntax Description	status	- Status of the propagation of TC in the associated rings, whenever the flush FDB (Filtering Database) is triggered for the sub-ring. Options are: <ul style="list-style-type: none"> • enable - Enables the propagation of TC in the associated rings, whenever the flush FDB is triggered for the sub-ring. • disable - Disables the propagation of TC in the associated rings, whenever the flush FDB is triggered for the sub-ring.
	ring-ids	- Ring ID to which the TC should to be propagated upon FDB flush condition in the sub-ring.

Mode Ring Group Configuration mode

Defaults

status	:	disable
ring-ids	:	None

Example iss(config-switch-ring)# aps propagate-tc status enable ring-ids 2



Related Commands

- ERPS functionality should be started in the virtual context, before executing this command.
- Ring ID of the ring (self ring ID) should not be configured in the TC ring ID list.
- **no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Creates the ring entry, configures the ring name for the given ring ID and enters into the ring group configuration mode.
- **show aps ring** - Displays the protection ring group related information.

25.17 show aps ring global info

This command displays the ERPS global information for a context.

```
show aps ring global info [switch <context_name>]
```

Syntax	switch	-	Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge.
Description			

Mode	Privileged Exec Mode / User Exec Mode
-------------	---------------------------------------

Example	iss# show aps ring global info switch 1
----------------	---

```
Switch 1
```

```
ERPS Global Info
```

```
-----  
Module Status           : Enabled  
System Control          : Start  
Trap Status             : Enabled
```



ERPS functionality should be started in the virtual context, before executing this command.

Related Commands	<ul style="list-style-type: none">• no shutdown aps ring - Starts the ERPS functionality in the virtual switch.• aps ring enable - Enables the ERPS functionality.• aps ring notification - Enables the sending of notification messages from ERPS to a remote management entity upon specific events.
-------------------------	---

25.18 show aps ring

This command displays the protection ring group related information.

```
show aps ring [group <group_id>] [{configuration | statistics | timers }]
[switch <context_name>]
```

**Syntax
Description**

- | | |
|----------------------|---|
| group | - Unique identifier for the protection group. |
| configuration | - Displays configuration (such as R-APS VLAN ID, ring ports, node type, and so on) of the protection ring groups in the virtual contexts. |
| statistics | - Displays statistics information (such as count of R-APS PDUs sent, R-APS PDUs received, R-APS PDUs discarded and so on) for each of the protection ring groups. |
| timers | - Displays timer related information (such as intervals of hold-off, wait-to-restore, guard and periodic timers) for each of the protection ring groups. |
| switch | - Context name that is used to distinguish between the multiple virtual bridge contexts within a bridge. |

Mode Privileged Exec Mode / User Exec Mode

Example

```
iss# show aps ring group 3
```

```
Switch 1
```

```
Ring Id 3
```

```
-----
Ring Name           : test
RAPS Vlan Id        : 1
Operating Mode       : Revertive
Recovery Method      : Auto
Ring State           : Protection
Status               : Active
Wait-to-restore timer : Not Running
Hold timer           : Not Running
Guard timer          : Not Running
TC Propagation Status : Enable
TC Propagation Ring List : 1,
```

```
This node is RPL Owner. RPL Port is Gi0/1
```

Ring Port	Link Status	Command	Port Status
Gi0/1	Not Failed	Force Switch	Blocked
Virtual Channel	Not Failed	None	UnBlocked

```
iss# show aps ring group 3 configuration
```

```
Switch 1
```

```
Ring Id 3 Configurations
```

```
-----
RingName                : test
R-APS Vlan Id           : 1
Ring Ports               : Gi0/1,0
Node Type                : RPL Owner
RPL Port                 : Gi0/1
Operating Mode           : Revertive
Recovery Method          : Auto
Switch Command           : Force
SwitchCommand Port       : Gi0/1
TC Propagation Status    : Enable
TC Propagation Ring List : 1,
```

```
Ring Id 3 CFM Configurations
```

```
-----
MEG1                     : 1
ME1                      : 3
MEP1                     : 5
MEG2                     : 7
ME2                      : 9
MEP2                     : 11
```

```
iss# show aps ring group 3 statistics
```

```
Switch 1
```

```
Ring Id 3 Statistics
```

```
-----
Port1 R-APS Pdu's Sent Count      : 14816
Port1 R-APS Pdu's Received Count  : 0
Port1 R-APS Pdu's Discarded Count : 0
Port1 Blocked Count               : 1
Port1 un-Blocked Count            : 0
Port1 Failed Count                : 0
Port1 recovered Count             : 0
Port2 R-APS Pdu's Sent Count      : 14818
Port2 R-APS Pdu's Received Count  : 0
Port2 R-APS Pdu's Discarded Count : 0
Port2 Blocked Count               : 0
Port2 un-Blocked Count            : 0
Port2 Failed Count                : 0
Port2 recovered Count             : 0
```

```
iss# show aps ring group 3 timers
```

```
Switch 1
```

Ring Id 3 Timers

```

-----
Periodic Timer Interval      : 10      milli-seconds
Hold-Off Timer Interval     : 1200000  milli-seconds
Guard Timer Interval        : 50000   milli-seconds
WTR Timer Interval          : 3        milli-seconds

```

Related
Commands

- ERPS functionality should be started in the virtual context, before executing this command.
- Ring entry should be created, before executing this command.
- **no shutdown aps ring** - Starts the ERPS functionality in the virtual switch.
- **aps ring group** - Creates a ring entry in the ERPS and enters into the ring group configuration mode.
- **aps group name** - Configures the ring name for the given ring ID and enters into the ring group mode.
- **clear aps ring statistics** - Clears the statistic counters for the given ring.
- **aps group active** - Activates the given ring group.
- **aps working** - Configures the ring ports and R-APS VLAN ID for the ring.
- **aps protect** - Configures the given port as RPL port for the ring group and by this the ring node becomes the RPL owner.
- **aps blockport-on-virtualchannel-recovery** - Allows blocking of subring port to avoid temporary loop in the subring, when the virtual channel of subring recovers.
- **aps working meg** - Associates the fault monitoring entities (Y.1731 specific) for each of the ring ports.
- **aps - force | manual** - Applies the force/manual switch for the ring on the given ring port.
- **aps revert** - Sets the operating mode of the ring group to revertive and sets the timer duration of wait-to-restore timer.
- **aps timers** - Configures the interval of the periodic timer, the hold-off timer and the guard timer.
- **aps propagate-tc** - Configures the propagate TC flag for the ring and configures the IDs of rings, for which the TC should be propagated.

Chapter

26

PBB

The PBB (Provider Backbone Bridge) provides Carrier Metro Ethernet connection. It interconnects Provider bridged networks for highly scalable service connections.

The PBB can function in the boundary of the provider backbone network and be called as Provider Backbone Edge Bridge (BEB) or in the core of the provider backbone network and be called as Provider Backbone Core Bridge (BCB).

BEB has I and B components, where the I - component maps the service VLANs from different provider bridges to the service instance within PBBN and the B component channelizes these requests into different BVLANS. The core bridges within the PBBN use BVLANS for switching the messages. Since the ether-types for BVLAN and SVLAN are same, the BCB configuration is same as PCB (Provider Core Bridge) configuration.

Provider/Customer network traffic will be mapped to a service instance inside an I component. The service instance is mapped to a backbone VLAN in the B component and packet processing inside the backbone network will be based on the backbone VLAN selected.

Interface Masters PBB has the following value addition over the standard PBB:

- a. Customer VLAN to service instance translation.
- b. Configuring the CVLAN to be transmitted through the PBBN.
- c. OUI as a configurable parameter.
- d. Connecting two different PBBNs having different OUI.



The list of CLI commands for the configuration of PBB are common to both **Single Instance** and **Multiple Instance** except for a difference in the prompt that appears for the Switch with Multiple Instance support.

- The prompt for the **Global Configuration Mode** is,

```
iss(config-switch)#
```
- The prompt for the **Service Instance Configuration Mode** is,

iss(config-switch-si)#

The list of commands for the configuration of PBB is as follows:

- shutdown provider-backbone-bridge
- set provider-backbone-bridge oui
- backbone instance
- set sizing parameters
- service instance
- map backbone instance
- port-type
- ethernet cfm mip level
- switchport pisisd
- set service-instance status
- service-instance map
- ports
- translate-isid
- member-ports vlan
- set service-type
- set service-instance oui
- ethernet cfm mep level
- link-type
- set destination-mac-address
- set customer unicast-mac learning
- set customer unicast-mac learning limit
- set default vid
- set ether-type
- pcp-selection-row
- use-dei
- require-drop-encoding
- show provider-backbone-bridge oui
- show pisisd
- show default vid
- show link-type
- show provider-backbone config
- show service-instance config
- show sizing parameters

- show backbone instance
- show backbone instance map

26.1 shutdown provider-backbone-bridge

This command shuts down the PBB feature in the bridge. All the memory and configuration of the PBB is removed. The no form of the command initializes the PBB.

shutdown provider-backbone-bridge

no shutdown provider-backbone-bridge

Mode	Global Configuration Mode
Package	Metro
Dynamic	This command is applicable at run time.
Example	<code>iss(config)# shutdown provider-backbone-bridge</code>

26.2 set provider-backbone-bridge oui

This command configures the OUI (Organization Unique Identifier) for the bridge. The no form of the command deletes the OUI configured at the bridge. In this case, the default OUI value is used.

This identifier is used by CBP to form the default destination address for a given ISID. For a specific ISID, this value can be overwritten by the OUI specified for that ISID inside service instance mode.

```
set provider-backbone-bridge oui <aa:aa:aa>
```

```
no provider-backbone-bridge oui
```

Syntax	oui	-	Organization Unique Identifier to be configured.
Description			This is a hexadecimal value that is set in 3 bytes, and the information of each byte is separated by a colon.
Mode	Global Configuration Mode		
Package	Metro		
Defaults	00:1E:83		
Example	iss(config)# set provider-backbone-bridge oui 00:1E:83		
Related Command	show provider-backbone-bridge oui - Displays the PBB OUI configured in the bridge.		

26.3 backbone instance

This command creates a provider backbone instance. The no form of the command deletes a provider backbone instance.

```
backbone instance <name(32)> [mac-address <aa:bb:cc:dd:ee:ff>]
```

```
no backbone instance <name(32)>
```

Syntax Description	name	- Name for backbone instance
	mac-address	- MAC address used by backbone instance
Mode	Global Configuration Mode	
Package	Metro	
Defaults	name	- Name will be instance<instance id>. For example, for backbone instance 1, the name will be instance 1.
Example	iss(config)# backbone instance inst2	
Related Command	show backbone instance - Displays the information of provider backbone instance	


26.4 set sizing parameters

This command sets the sizing values for the new parameters that are defined for PBB.



This command is obsolete from the release ISS 6.3.0 onwards.

```
set sizing parameters [max_isid <integer(1-131072)>] [max_isid_per_context
<integer(1-65536)>] [max_ports_per_isid <integer(1-128)>]
[max_ports_per_isid_per_context <integer(1-128)>]
```

Syntax Description	<div> max-isid - Maximum number of ISID on the system across all contexts. </div> <div> max-isid_per_context - Max number of ISID per context or component. </div> <div> max_ports_per_isid - Maximum number of member port list for ISID. </div> <div> max_ports_per_isid_per_context - Maximum number of member port list for ISID per context. </div>
Mode	Global Configuration Mode
Package	Metro
Defaults	<div> max-isid - 131072 (128K) </div> <div> max-isid_per_context - 65536 (64K) </div> <div> max_ports_per_isid - 128 </div> <div> max_ports_per_isid_per_context - 128 </div>
Example	<code>iss(config)# set sizing parameters max-isid 4096</code>
	This command is applicable only after next reboot of the system.
Related Command	show sizing parameters - Displays the sizing values for new parameters that are defined for PBB.

26.5 service instance

This command configures a service instance in the switch and is also used to enter into the service instance configuration mode. These values are used as service-instance values inside I and B components of PBB.

The no form of the command deletes the service instance from the switch.

```
service instance <service-instance (256-16777214)>
```

```
no service-instance <service-instance (256-16777214)>
```

Mode Switch Configuration Mode

Package Metro

Defaults None


Example `iss(config-switch)# service-instance 2434`

Related Command **show service-instance config** - Displays all the data related to the ISID given as the parameter.

26.6 map backbone instance

This command maps a context to a given provider backbone instance.

map backbone instance <name(32)>

Syntax Description	name - Name for backbone instance
Mode	Switch Configuration Mode
Package	Metro
Defaults	Name will be instance<instance id>. For example, for backbone instance 1, the name will be instance 1.
Example	<pre>iss(config-switch)# map backbone instance inst2</pre>
	The backbone instance to which the context is being mapped should exist.
Related Command	show backbone instance map - Displays the mapping of provider backbone instance and contexts

26.7 port-type

This command configures the PIP port type.

port-type providerInstancePort

Syntax Description	providerInstancePort	- Backbone Edge Bridge Port that can receive and transmit I-tagged frames for multiple customers. PIPs are applicable only on PBB I Components.
---------------------------	-----------------------------	---

Mode	Interface Configuration Mode
-------------	------------------------------

Package	Metro
----------------	-------

Example	<code>iss(config-if)# port-type providerInstancePort</code>
----------------	---



PBB Ports - PIP

Related Command	<code>show interface bridge port-type</code> - Displays the Bridge Port Type of interfaces in the switch.
------------------------	---

26.8 ethernet cfm mip level

This command configures a MIP (Maintenance Intermediate Point) for a service-instance on an interface. The no form of the command removes the MIP configuration.

```
ethernet cfm mip {domain <domain-name> | level <level-id (0-7)>} [active]
```

```
no ethernet cfm mip {domain <domain-name> | level <level-id (0-7)>} [active]
```

Syntax Description	domain	- Identifies the Maintenance Domain. The maximum length of the domain-name is 20.
	level	- Maintenance level at which the MIP is defined. This value ranges between zero and seven.
	active	- The operational status of the MIP.
Mode	Service Instance configuration mode	
Package	Metro	

PBB Ports CBP

Defaults Operational status of MIP - disabled

Example `iss(config-if)# ethernet cfm mip level 7 active`



- PBB Ports - CBP
- This command can be used to configure a MIP for a service-instance on a CBP only. If given for other ports, it is ignored.

Related Command `show ethernet cfm maintenance-point local` - Displays the details of the MEP and the MIP configured on a device.

26.9 switchport pisisd

This command configures the P-ISID on the ports in PBB bridge mode. The no form of the command removes the P-ISID from the port.

```
switchport pisisd <isisd (256-16777214)>
```

```
no switchport pisisd
```

Syntax Description	isisd	- Value of the P-ISID to be configured on the port.
Mode	Interface Configuration Mode	
Package	Metro	

Example `iss(config-if)# switchport pisisd 1000`



- PBB Ports - CNP
- If this command is given multiple times, it overwrites the previous configuration of P-ISID on the port.
- This command is applicable on CNP only. It is ignored when given on some other port.
- If PISISD is configured, then it will be used for transporting the packet in PBBN.

Related Command `show pisisd` - Displays the P-ISID configured on a port.

26.10 set service-instance status

This command enables or disables the particular ISID in the switch. By default, the ISID is not active.

```
set service-instance status {enable|disable}
```

Syntax Description	enable/disable - Enables/disables the customer MAC learning.
---------------------------	---

Mode	Service Instance Configuration Mode
-------------	-------------------------------------

Package	Metro
----------------	-------

Defaults	Disabled
-----------------	----------

Example	<code>iss(config-switch-si)# set service-instance status active</code>
----------------	--


Related Command	<ul style="list-style-type: none">• show service-instance config - Displays all the data related to the ISID given as the parameter.• set service-type - Removes the destination MAC address for the ISID.
------------------------	---

26.11 service-instance map

This command specifies the following:

- Mapping of the S-VLAN and C-VLAN to the ISID.
- Tag/Untag status of the given ports for S-VLAN and C-VLAN used for egress tagging of the first level encapsulated tag (S-Tag).

service-instance map untagged-pip { true | false } [vlan <port_list>]

Syntax Description	untagged-pip - Specifies tagging/untagging status of the first level encapsulated tag (C-Tag/S -Tag) from CNP to PIP. Specifies that S-Tag/C-Tag should be removed/inserted when sending the packet for the S-VLAN/C-VLAN (from the set of S-VLANs/C-VLANs configured) from the CNP to the PIP. <ul style="list-style-type: none"> • True - Tag will be removed. • False - Tag will be inserted.
Mode	<port_list> - Range of VLAN to be mapped to ISID. Service Instance Configuration Mode
Package	Metro
Defaults	false
Example	iss(config-switch-si)# service-instance map untagged-pip true vlan 1,2
	<ul style="list-style-type: none"> • If this command is given multiple times with the same value of untagged-pip for S-VLAN/C-VLAN, it overwrites all the mappings of the S-VLAN/C-VLAN. • An empty portlist deletes mapping of all VLANs to the service-instance.
Related Command	show service-instance config - Displays all the data related to the ISID given as the parameter.

26.12 ports

This command gives member ports of an ISID in a component.

```
ports {icomp | bcomp } [<interface-type> <0/a-b,0/c,...> ] [<interface-type>
<0/a-b,0/c,...> ] [virtual <0/a-b,0/c,...>] [port-channel <0/a-b,0/c,...> ]
```

Syntax Description	icomp/bcomp	- Specifies whether the portlist belongs to an I component or a B component.
	<interface-type> <0/a-b,0/c,...>	- Interface type and the port identifier. Type depends on the parameter with which these ports are associated (cbp, pip). Ranges of ports can also be given.
	<interface-id>	- There can be only one port when the port type is PIP. This is specified by a single interface-ID.
	virtual <0/a-b,0/c,...>	- Logical ports and the identifier of the port. Type depends on the parameter with which these ports are associated (pip, cbp). Ranges of ports can also be given. There can be only one port when the port type is a PIP.
	<port-channel> <a,b, c-d...>	- Port channel and the identifier of the port. Type depends on the parameter with which these ports are associated (pip, cbp). Ranges of ports can also be given. There can be only one port when the port type is PIP.

Mode Service Instance Configuration Mode

Package Metro

Example `iss(config-switch-si)# ports icomp gigabitethernet 0/6 0/7-9`



- PBB Ports - PIP and CBP
- If this command is given multiple times for a particular component, it will overwrite the previous configuration for that component.
- The following table specifies the port types for which this command is applicable:

I component	PIP
B component	CBP

- An empty portlist deletes mapping of all ports to the service-instance.

Related Command `show service-instance config` - Displays all the data related to the ISID given as the parameter.

26.13 translate-isid

This command gives the Local ISID (ISID used outside the bridge) to which the ISID of the mode is to be translated and also gives the list of the ports for which this translation is to be used. The no form of the command removes the mapping of the Backbone/Relay ISID and the Local/Translate ISID for the given port.

```
translate-isid <isid (256-16777214)> ([<interface-type> <0/a, 0/b, 0/c-d,...>]
[<interface-type> <0/a, 0/b, 0/c-d,...>] [port-channel <a,b,c-d,...>] [virtual
<iface_list> ])
```

```
no translate-isid ([<interface-type> <0/a, 0/b, 0/c-d,...>] [<interface-type>
<0/a, 0/b, 0/c-d,...>] [port-channel <a,b,c-d,...>] [virtual <iface_list> ])
```

Syntax Description	isid	- Local ISID used outside the bridge.
	<interface-type> <0/a, 0/b, 0/c-d...>	- Interface type with the port identifier for which the translation is defined. Ranges can also be given.
	virtual <iface_list>	- Logical ports with the port identifier for which the translation is defined. Ranges can also be given.
	<port-channel> <a,b,c-d...>	- Port channel with the port identifier for which the translation is defined. Ranges can also be given.

Mode Service Instance Configuration Mode

Package Metro

Example `iss(config-switch-si)# translate-isid 1000 gigabitethernet 0/1-5`



- PBB Ports - CBP
- The ISID in the configuration mode is actually the Backbone/Relay ISID used by the port towards the Relay entity (inside the bridge). The ISID given in this command is the local ISID, that is, the ISID outside the bridge. This translation can be done at CBP. Any other configuration in the bridge referring to the ISID uses the Backbone/Relay ISID and not the Local/Translate ISID.
- This configuration is done only when the translation is required, that is, Local and Backbone ISIDs are different. This translation is used for both ingress and egress packets. This means that Backbone to Local when sending outside the bridge after all the processing of the ISID and Local to Backbone when a packet is received from outside the bridge before any processing on the ISID in the packet. This command is typically used for PBBN to PBBN interface.
- This command can be given multiple times for configuration on different ports.

- If this command is given again for the same port and the same Backbone/Relay ISID, then the previous mapping is overwritten by the new Translate/Local ISID.
- The port or port list is mandatory for this command, though it may be given as an interface type, virtual port, or a port channel.

Related Command **show service-instance config** - Displays all the data related to the ISID given as the parameter.

26.14 member-ports vlan

This command does the mapping of the ISID to the B-VLAN and also the mapping of member ports of the ISID to the B-VLAN. This command can be given multiple times for different B-VLANs. The no form of the command deletes the ISID-B-VLAN mapping.

```
member-ports vlan <bvlan-id (1-4094)> { [<interface-type> <0/a, 0/b, 0/c-d,...>] [port-channel <a,b,c-d,...>] [virtual <a,b,c-d,...>] }
```

```
no member-ports vlan { [<interface-type> <0/a, 0/b, 0/c-d,...>] [port-channel <a,b,c-d,...>] [virtual <a,b,c-d,...>] }
```

Syntax Description	bvlan-id	- B-VLAN ID to which the ISID is mapped. One ISID can map to only one B-VLAN on one port but the same ISID can map to a different B-VLAN on a different port.
	<interface-type> <0/a, 0/b, 0/c-d...> <port-channel> <a,b,c-d...> [virtual <a,b,c-d,...>]	- CBP interface (list) for which the B-VLAN is configured. Ranges can also be given. - Port channel with the port identifier for the B-VLAN mapped to the ISID. Ranges can also be given. - Logical ports with the port identifier for the B-VLAN mapped to the ISID. Ranges can also be given. There can be multiple ports or multiple ranges of the ports for an ISID and B-VLAN mapping.

Mode Service Instance Configuration Mode

Package Metro

Example

```
iss(config-switch-si)# member-ports vlan 1 gigabitethernet 0/1, 0/2, 0/3-4
```

```
iss(config-switch-si)# no member-ports vlan gigabitethernet 0/1, 0/2
```



- If the command is given multiple times for the same port then it will overwrite the previous mapping of the B-VLAN.
- There can be multiple ports and or multiple ranges of the ports for an ISID and B-VLAN mapping.

Related Command **show service-instance config** - Displays all the data related to the ISID given as the parameter.

26.15 set service-type

This command removes the destination MAC address for the ISID.

```
set service-type {icomp | bcomp ([<interface-type> <0/a, 0/b, 0/c-d,...>][<interface-type> <0/a, 0/b, 0/c-d,...>][port-channel <a,b,c-d,...>][virtual <a,b,c-d,...>])} {ingress | egress | ingress-egress}
```

Syntax Description	icomp	- Bridge of the type I-Component
	bcomp	- Bridge of the type B-Component
	<interface-type>	- Interface type and port.
	<0/a, 0/b, 0/c-d,...>	
	port-channel <a,b,c-d,...>	- Port channel with the port identifier
	virtual <a,b,c-d,...>	- Logical ports with the port identifier
	ingress	- Ingress service-type
	egress	- Egress service-type
	ingress-egress	- Ingress/Egress service-type

Mode Service Instance Configuration Mode

Package Metro

Example `iss(config-switch-si)# set service-type bcomp gigabitethernet 0/1, 0/3-4 port-channel 2 egress`



Service instance status should be disabled before setting the service type.

Related Command `set service-instance status` - Enables or disables the particular ISID in the switch.


26.16 set service-instance oui

This command configures the OUI (Organization Unique Identifier) for an ISID per port. The no form of the command deletes the OUI configured for the ISID on all ports.

This identifier is used by CBP to form the default destination address.

```
set service-instance oui <aa:bb:cc> ([<interface-type> <0/a, 0/b, 0/c-d,...>]
[<interface-type> <0/a, 0/b, 0/c-d,...>] [virtual <iface_list> ] [port-channel
<a,b,c-d,...>])
```

```
no service-instance oui { [<interface-type> <0/a, 0/b, 0/c-d,...>] [<port-
channel> <a,b,c-d,...>] [virtual <iface_list>] }
```

Syntax Description	<div>oui</div> <ul style="list-style-type: none"> - Organization Unique Identifier to be configured for the given ISID per port. This is a hexadecimal value that is set in 3 bytes, and the information of each byte is separated by a colon. <div><interface-type> <0/a, 0/b, 0/c-d...></div> <ul style="list-style-type: none"> - Interface type and port on which this oui is mapped to the given OUI. <div><port-channel> <a,b,c-d...></div> <ul style="list-style-type: none"> - Port channel with the port identifier on which this oui is mapped to the given OUI. <div>[virtual <iface_list>]</div> <ul style="list-style-type: none"> - Logical ports with the port identifier on which this oui is mapped to the given OUI.
Mode	Service Instance Configuration Mode
Package	Metro
Defaults	00:1E:83
Example	<pre>iss(config-switch-si)# service-instance oui 00:1E:83 gigabitethernet 0/1</pre>
	While executing this command, the portlist cannot be empty.
Related Command	show service-instance config - Displays all the data related to the ISID given as the parameter.

26.17 ethernet cfm mep level

This command configures the MEP for a service instance. The no form of the command removes the MEP configured.

```
ethernet cfm mep {domain <domain-name> | level <level-id (0-7)>} [inward] mpid
<mpid (1-8191)> [active]
```

```
no ethernet cfm mep {domain <domain-name> | level <level-id (0-7)>} [inward]
mpid <mpid (1-8191)> [active]
```

Syntax Description	domain	- Identifies the Maintenance Domain. The maximum length of the domain-name is 20.
	level	- Maintenance Domain level for the MEP. This value ranges between zero and seven.
	inward	- Specifies the direction. By default, outward is created, that is, down MEP
	Mpid	- MEP identifier. This value ranges between 1 and 8191
	active	- Operational status of the MEP. This can be used to set the operational status of an already configured MEP.

Mode Service Instance Configuration Mode

Package Metro

Defaults disabled (If active is not given for the operation status.)

Example `iss(config-switch-si)# ethernet cfm mep level 7 mpid 1`



This command is applicable only to configure a Down MEP for an ISID on an I component. MEP is configured for all ports associated with the service-instance.

26.18 link-type

This command configures the link-type as point-to-point or shared for a service-instance. This command internally is used to set the oper point-to-point status for a service-instance. The no form of the command sets the link type as Auto.

```
link-type { point-to-point | shared }
```

```
no link-type
```

Syntax Description	link-type	- The link can be a point-to-point link or a shared LAN segment on which another bridge is present.
Mode	Service Instance Configuration Mode	
Package	Metro	

Defaults shared

Example iss(config-switch-si)# link-type shared



The command is used at PIP only.

Related Command **show link-type** - Displays the link-type configured on a service-instance.

26.19 set destination-mac-address

This command configures a unicast or a multicast destination address to be used as the default destination address for an ISID. The no form of the command removes the configured destination address.

```
set destination-mac-address <aa:aa:aa:aa:aa:aa>
```

```
no destination-mac-address
```

Syntax Description	aa:aa:aa:aa:aa:aa - Unicast/Multicast MAC address to be used as the default destination address for an ISID.
---------------------------	---

Mode	Service Instance Configuration Mode
-------------	-------------------------------------

Package	Metro
----------------	-------

Example	<pre>iss(config-si)# set destination-mac-address 00:11:22:33:44:55</pre>
----------------	--



- This address is used by the PIP to set the default destination address in the packets being sent to the B component (customer MAC learning for the C-DA is not done).
- This address is used by the CBP to overwrite the destination address set by the PIP in the incoming packet, when the destination address already in the packet is a SIGA or a multicast address. In case the incoming packet contains a unicast address, then CBP does not use this address.
- This command is applicable at PBB I-comp only

Related Command	show service-instance config - Displays all the data related to the ISID given as the parameter.
------------------------	---

26.20 set customer unicast-mac learning

This command enables/disables the customer MAC learning for an isid.

```
set customer unicast-mac learning {enable | disable}
```

Syntax Description	enable	- Enables the customer MAC learning.
	disable	- Disables the customer MAC learning.

Mode Service Instance Configuration Mode

Package Metro

Defaults enable

Example `iss(config-switch-si)# set customer unicast-mac learning disable`



This command is applicable at PBB I-comp only.

Related Command **show provider-backbone config** - Displays all the service data configured on the service-instance given as the parameter.

26.21 set customer unicast-mac learning limit

This command configures the learning limit for customer MAC addresses. The no form of the command resets the MAC learning limit to default value.

```
set customer unicast-mac learning limit <size(0-4294967295)>
```

```
no customer unicast-mac learning limit
```

Syntax Description	size - Limit of the MAC learning.
---------------------------	--

Mode	Service Instance Configuration Mode
-------------	-------------------------------------

Package	Metro
----------------	-------

Defaults	Default value varies with target.
-----------------	-----------------------------------

Example	<pre>iss(config-switch-si)# set customer unicast-mac learning limit 100</pre>
----------------	---

Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.
------------------------	---

26.22 set default vid

This command configures the default SVID/CVID for an I component ISID in PBB bridge mode. The no form of the command removes the default SVID/CVID from the port and resets it to the PVID.

```
set default vid <vlan-id (1-4094)>
```

```
no default vid
```

Syntax Description	vlan-id	- Default SVID/CVID to be configured.
Mode	Service Instance Configuration Mode	
Package	Metro	

Example `iss(config-switch-si)# switchport default vid 10`



- If this command is given multiple times for the same port, then it overwrites the previous configuration of default SVID/CVID on the port respectively.
- Its usage is as follows:
 - In S-VLAN based I component – for untagged packets PVID for vip will be used as SVID.
 - In C-VLAN based I component – for untagged packets, PVID for vip will be used as CVID.

Related Command **show default vid** - Displays the default svid and cvid configured on a port, if the interface is specified.

26.23 set ether-type

This command configures the port ingress/egress ether-type in PBB mode. The no form of the command resets port ingress/egress ether-type.

In PBB bridge mode, this command is applicable at VIP for specifying ether type for S-tag.

```
set { ingress | egress } ether-type <integer(1-65535)>
```

```
no { ingress | egress } ether-type
```

Syntax Description	ingress	- Ingress ether-type
	egress	- Egress ether-type
	integer(1-65535)	- S-VLAN/B-VLAN tag ether type used for the packets received on this port. Packets received on a port are considered tagged, when the packet ethertype matches with the port ether type configured. Otherwise, they will be considered untagged.

Mode Service Instance Configuration Mode

Package Metro

Example `iss(config-switch-si)# set ether-type ingress 23`



The ethertype configured at the PIP is used for translating the S-Tag ethertype, before sending the packet out at the PIP. Similarly, the S-Tag ethertype is translated at CNP, before sending the packet out using the ethertype configuration at CNP.

The following table specifies valid ether-types for different port types:

Port Type	Ethertype
CNP	S-TAG
PIP	S-TAG
CBP	NA
PNP	B-TAG

Related Command `show provider-backbone config` - Displays all the service data configured on the service-instance given as the parameter.

26.24 set vlan swap

This command enables/ disables VLAN swapping of a C-VLAN/S-VLAN associated to a service-instance

```
set vlan swap {enable | disable}
```

Syntax Description	enable	- Enables VLAN swapping.
	disable	- Disables VLAN swapping
Mode	Service Instance Configuration Mode	
Package	Metro	
Default	enable	
Example	<pre>iss(config-switch-si)# set vlan swap enable</pre>	
Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.	

26.25 set vlan mapping

This command configures a VLAN translation entry for a VLAN associated to a service-instance for a port. The no form of the command deletes the VLAN translation for the service-instance.

```
set vlan mapping <local vlan integer (1-4094)> <relay vlan integer (1-4094)>
```

```
no vlan mapping <vlan integer (1-4094)>
```

Syntax Description	local vlan	- Value of the VID outside (sent/received) the bridge.
	relay vlan	- Value of the VID towards the relay entity of the bridge, that is, the VID value used inside the bridge
	vlan	- Local VID value in the no form of the command to delete the entry.
Mode	Service Instance Configuration Mode	
Package	Metro	
Example	iss(config-switch-si)# set vlan mapping 1 2	
Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.	

26.26 shutdown

This command enables sending and reception of packets for this service-instance. The no form of the command disables sending of the packets. This specifies the operational status of the VIP associated with the ISID.

shutdown

no shutdown

Mode Service Instance Configuration Mode

Package Metro

Example `iss(config-switch-si)# shutdown`

Related Command **show provider-backbone line** - Displays the status of whether the packets can be sent or received for a service-instance in a context.

26.27 pcp-selection-row

This command configures the PCP selection row parameter for a service-instance. This is used to select a row in the PCP encoding and decoding table.

pcp-selection-row {8P0D | 7P1D | 6P2D | 5P3D}

Syntax Description	pcp-selection-row - Specifies the row to be used in the PCP encoding and decoding table.
Mode	Service Instance Configuration Mode
Package	Metro
Defaults	8P0D
Example	<pre>iss(config-switch-si)# pcp-selection-row 7P1D</pre>
Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.

26.28 use-dei

This command configures the use_dei (Drop Eligibility Indicator) for the service-instance.

use-dei {true | false}

Syntax Description	use-dei - Configures the value of the use-dei as true or false.
Mode	Service Instance Configuration Mode
Package	Metro
Defaults	true
Example	iss(config- switch-si)# use-dei true
Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.

26.29 require-drop-encoding

This command configures the require-drop-encoding parameter for service-instance.

require-drop-encoding {true | false}

Syntax Description	require-drop-encoding - Configures the value of the require-drop-encoding as true or false.
Mode	Service Instance Configuration Mode
Package	Metro
Defaults	false
Example	<pre>iss(config- switch-si)# require-drop-encoding true</pre>
Related Command	show provider-backbone config - Displays all the service data configured on the service-instance given as the parameter.

26.30 pcp-encoding

This command configures the encoding table on the service-instance. The no form of the command configures default values for PCP encoding table.

```
pcp-encoding <pcp-selectionrow {8P0D | 7P1D | 6P2D | 5P3D}> priority <decoded-  
priority (0-7)> drop-eligible {true | false} pcp <encoded-priority (0-7)>
```

```
no pcp-encoding <pcp-selectionrow {8P0D | 7P1D | 6P2D | 5P3D}>
```

Syntax Description	pcpselectionrow	- Selection row in the PCP encoding table
	priority	- Priority received in the packet (decoded priority)
	drop-eligible	- Determines the drop eligibility of the packet as true or false
	pcp	- Encoded Priority

Mode Service Instance Configuration Mode / Interface Configuration Mode

Package Metro

Defaults pcpselectionrow 8P0D

Example iss(config-switch-si)# pcp-encoding 7P1D priority 7 drop-eligible false
pcp 6

```
iss(config-switch-si)# pcp-encoding priority 1 drop-eligible true pcp 0
```



- The default configuration of the PCP encoding table is given in the below mentioned table.

Priority		7	7DE	6	6DE	5	5DE	4	4DE	3	3DE	2	2DE	1	1DE	0	0DE
Drop Eligible																	
PCP	8P0D	7	7	6	6	5	5	4	4	3	3	2	2	1	1	0	0
	7P1D	7	7	6	6	5	4	5	4	3	3	2	2	1	1	0	0
	6P2D	7	7	6	6	5	4	5	4	3	2	3	2	1	1	0	0
	5P3D	7	7	6	6	5	4	5	4	3	2	3	2	1	0	1	0

- Refer the Standard IEEE 802.1ad/d6 –section 6.7.3 for details on Priority Code point selection row
- show provider-backbone config** - Displays all the service data configured on the service-instance given as the parameter.

Related Command

26.31 pcp-decoding

This command configures the PCP decoding table on the service-instance. The no form of the command configures the default values for the PCP decoding table.

```
pcp-decoding <pcpselectionrow(8P0D|7P1D|6P2D|5P3D)> pcp <recv priority (0-7)>
priority <decoding priority (0-7)> drop-eligible {true|false}
```

```
no pcp-decoding <pcpselectionrow(8P0D|7P1D|6P2D|5P3D)>
```

Syntax Description	pcpselectionrow	- Selection row in the PCP encoding table
	pcp	- Priority received from the packet (priority to be decoded)
	priority	- Decoded priority for the packet
	drop-eligible	- Determines the drop eligibility of the packet as true or false

Mode Service Instance Configuration Mode / Interface Configuration Mode

Package Metro

Defaults pcpselectionrow - 8P0D

Example iss(config-if)# pcp-decoding 6P2D pcp 4 priority 4 drop-eligible false

```
iss(config-if)# pcp-encoding pcp 1 priority 0 drop-eligible
true
```



The default values of the PCP decoding table are given in the below mentioned table.

PCP		7	6	5	4	3	2	1	0
Priority Drop Eligible	8P0D	7	6	5	4	3	2	1	0
	7P1D	7	6	4	4DE	3	2	1	0
	6P2D	7	6	4	4DE	2	2DE	1	0
	5P3D	7	6	4	4DE	2	2DE	0	0DE

Related Command **show provider-backbone config** - Displays all the service data configured on the service-instance given as the parameter.

26.32 show provider-backbone-bridge oui

This command displays the PBB OUI configured in the bridge. If no OUI is configured explicitly, it displays the default value of the OUI.

show provider-backbone-bridge oui

Mode Privileged Exec Mode

Package Metro

Example iss(config)# show provider-backbone-bridge oui

Configured OUI : 02:03:04

26.33 show pisisd

This command displays the P-ISID configured on a port, if the interface is specified. If the interface is not specified, it displays P-ISID configured on all the ports.

```
show pisisd [{port <iftype> <ifnum> | switch <string(32)>}]
```

Syntax Description	iftype	- Type of the interface.
	ifnum	- Interface ID of the port.
	switch	- Switch/Context name. This is specific to Multiple Instance.

Mode Privileged Exec Mode

Package Metro

Example iss# show pisisd

```
Switch default
```

```
PISID table
```

```
-----  
Port      PISID  
-----  
Gi0/7     1000  
Gi0/6     2000
```



This command is valid only for ports in PBB bridge mode.

26.34 show default vid

This command displays the default svid and cvid configured on a service-instance.

```
show default vid service-instance <integer(256-16777214)> [switch  
<string(32)>]
```

Syntax Description	switch	- Switch/Context name. This is specific to Multiple Instance.
---------------------------	---------------	---

Mode	Privileged Exec Mode
-------------	----------------------

Package	Metro
----------------	-------

Example	iss# show default vid service-instance 456 Default vid :10
----------------	---

26.35 show link-type

This command displays the link-type configured on a service-instance.

```
show link-type service-instance <integer(256-16777214)>
```

Mode Privileged Exec Mode

Package Metro

Example iss# show link-type service-instance 456
Link Type is shared

26.36 show provider-backbone config

This command displays all the service data configured on the service-instance given as the parameter.

show provider-backbone config service-instance <integer(256-16777214)> [**switch** <string(32)>]

Syntax Description **service-instance** - service-instance whose data is to be displayed.

Mode Privileged Exec Mode

Package Metro

Example iss# show provider-backbone config service-instance 300

```
Switch default
```

```
Provider Backbone Bridge configuration table
```

```
-----
```

```
% Invalid Interface
```

```
Switch 1
```

```
Provider Backbone Bridge configuration table
```

```
-----
```

```
PCP Encoding Table:
```

```
-----
```

```
DropEligible: 0DE 0 1DE 1 2DE 2 3DE 3 4DE 4 5DE 5 6DE 6 7DE 7
Priority      :
```

```
-----
```

8POD	:	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7
7P1D	:	0	0	1	1	2	2	3	3	4	5	4	5	6	6	7	7
6P2D	:	0	0	1	1	2	3	2	3	4	5	4	5	6	6	7	7
5P3D	:	0	1	0	1	2	3	2	3	4	5	4	5	6	6	7	7

```
PCP Decoding Table:
```

```
-----
```

PCP	:	0	1	2	3	4	5	6	7
8POD	:	0	1	2	3	4	5	6	7
7P1D	:	0	1	2	3	4DE	4	6	7
6P2D	:	0	1	2DE	2	4DE	4	6	7
5P3D	:	0DE	0	2DE	2	4DE	4	6	7

```
Ingress EtherType      : 0x88a8
```

```
Egress EtherType       : 0x88a8
```

```
Require Drop Encoding   : True
```

```
Use_DeI                 : True
```

```
PCP Selection Row       : 8P0D
```

```
Customer Unicast Mac Learning Status      : Enable
```

Customer Unicast Mac Learning Limit : 150

Service Vlan Mapping

Local service vlan Relay service vlan

 1 2

Service Vlan Translation Status : Enable

26.37 show provider-backbone line

This command displays the status of whether the packets can be sent or received for a service-instance in a context.

```
show provider-backbone line service-instance <integer(256-16777214)> switch  
<string(32)>
```

Syntax	service-instance	-	service-instance whose data is to be displayed.
Description	switch	-	Context ID.

Mode Privileged Exec Mode

Package Metro

Example iss# show provider-backbone line service-instance 345 switch1
line protocol is up (connected)

26.38 show service-instance config

This command displays all the data related to the ISID given as the parameter. If no ISID is given, then the command displays information of all the ISIDs configured in the system.

```
show service-instance config [{service-instance <integer(256-16777214)>|
switch <string(32)>}]
```

Syntax Description **service-instance** - service-instance whose data is to be displayed.

Mode Privileged Exec Mode

Package Metro

Example iss# show service-instance config

```
Switch 1
```

```
Service Instance table
```

```
-----
ISID      : 256
Component : 1
Status    : ACTIVE
```

```
-----
PIP Member Port
```

```
-----
Port Id      : Gi0/5
PIP Mac addr : 00:01:02:03:04:05
Service Type : Ingress-Egress
VLAN with Tagged PIP : 256
VLAN with Un-tagged PIP :
```

```
ISID      : 257
Component : 1
Status    : ACTIVE
```

```
-----
PIP Member Port
```

```
-----
Port Id      : Gi0/5
PIP Mac addr : 00:01:02:03:04:05
Service Type : Ingress-Egress
VLAN with Tagged PIP : 257
VLAN with Un-tagged PIP :
```

26.39 show sizing parameters

This command displays all the scalable parameters configured within the system and those that will be applicable after reboot.



This command is obsolete from the release ISS 6.3.0 onwards.

show sizing parameters

Mode Privileged Exec Mode

Package Metro

Example iss# show sizing parameters

```
Sizing parameters in system:
Max no.of ISID: 131072
Max no.of ISID per context: 65536
Max no.of ports per ISID: 128
Max no.of ports per ISID per context:123

Sizing parameters after next reboot:
Max no.of ISID: 131072
Max no.of ISID per context: 65536
Max no.of ports per ISID: 128
Max no.of ports per ISID per context: 123
```

26.40 show backbone instance

This command displays the information of provider backbone instance.

show backbone instance [<name(32)>]

Syntax Description **name** - Name for backbone instance

Mode Privileged Exec Mode

Package Metro

Example iss# show backbone instance
Backbone Instance Table

Instance Name : default
Mac Address : 00:05:02:03:06:ff
No.of I-Components : 0
No.of B-Components : 0
No.of Beb Ports : 0

Instance Name : inst2
Mac Address : 00:05:02:03:07:ff
No.of I-Components : 1
No.of B-Components : 0
No.of Beb Ports : 1
Associated Virtual Context(s): Switch 1



If this command is executed without the optional parameters, then the information for all the available instances will be displayed.

Related Command **backbone instance** - Creates a provider backbone instance.

26.41 show backbone instance map

This command displays the mapping of provider backbone instance and contexts.

show backbone instance map [**switch** <string(32)>]

Syntax Description **switch** - Context/Switch Name

Mode Privileged Exec Mode

Package Metro

Example iss# show backbone instance map
Switch default

Switch 1
Backbone Instance: inst2



If this command is executed without the optional parameters, then the instance mapping for all the contexts will be displayed.

Related Command **map backbone instance** - Maps a context to a given provider backbone instance

Chapter

27

PBB-TE

PBB-TE (Provider Backbone Bridge Traffic Engineering) enhances the PBB solution by allocating some or all the VLANs in the backbone network for setting up externally provisioned switched paths known as ESPs (Ethernet Switched Paths) in the PBB Network. The ESPs are setup from one CBP (Customer Backbone Port) at the edge of a PBB network to another.

The PBB-TE management or the external control plane is responsible for maintaining and controlling all the active topology information to support point-to-point or point-to-multipoint ESP over the PBB-TE region. The provisioned PBB-TE active topology can co-exist with active topologies associated with the dynamic spanning tree protocols. The PBB-TE external agent takes control of the VLANs assigned to the ESP-VID range on the Bridges in a PBB-TE region. Similar to the forwarding connectivity created by the operation of spanning tree and MAC learning procedures, the PBB-TE management /external control plane also forms an active topology of CBP rooted trees, from each CBP belonging to a PBB-TE region to a specific subset of any other CBPs in this region. These trees define the path(s) taken by the frames that belong to ESPs within the PBB-TE region. Furthermore, each such tree is qualified by the PBB-TE reserved ESP-VID, thus enabling the construction of independent trees per ESP-VID.

Hence, an ESP is uniquely identified by the following **3 tuples**:

- Source CBP MAC address
- Destination CBP MAC address
- VLAN ID which carries the ESP in a layer 2 network.

Any frame carried on a given ESP always contains the same Source, Destination MAC addresses and VLAN ID in its Ethernet header.

This static and provisioned nature of ESPs enables the Provider Backbone network to support precise traffic engineering for frames carried on the ESP.

The list of commands for the configuration of PBB-TE is as follows:

- shutdown backbone traffic-engineering
- backbone ethernet-switched-path vlans
- backbone traffic-engineering service-instance
- ethernet-switched-path
- debug backbone traffic-engineering
- show backbone traffic-engineering status
- show backbone ethernet-switched-path vlans
- show backbone traffic-engineering service-instance

27.1 shutdown backbone traffic-engineering

This command shuts down the backbone traffic-engineering service. The no form of the command starts and enables the traffic-engineering service.

shutdown backbone traffic-engineering

no shutdown backbone traffic-engineering

Mode Switch Configuration Mode

Package Metro

Example `iss(config-switch)# shutdown backbone traffic-engineering`



When shutdown, all resources used by PBB-TE module in the given switch are released to the mempool.


Related Command **show backbone traffic-engineering status** - Displays PBBTE start/shutdown status, ESP counters and max-limits.

27.2 backbone ethernet-switched-path vlans

This command configures a VLAN or a list of VLANs to use as ESP VLANs. The no form of the command removes the VLANs from the ESP list.

```
backbone ethernet-switched-path vlans <vlan_range>
```

```
no backbone ethernet-switched-path vlans <vlan_range>
```

Syntax Description	vlan_range - List of VLANs allocated for provisioning TE Ethernet switched paths.
Mode	Switch Configuration Mode
Package	Metro
Example	<pre>iss(config-switch)# backbone ethernet-switched-path vlans 24</pre>
	All the VLANs, specified in the list, should have been created and should be active.
Related Command	<pre>show backbone ethernet-switched-path vlans</pre> - Displays ESP VLANs.

27.3 backbone traffic-engineering service-instance

This command moves into the TE service instance mode. The no form of the command deletes the given entry from the TESID (Traffic Engineering Service Instance Identifier) table.

```
backbone traffic-engineering service-instance <pbb-tesid(1-4294967295)>
```

```
no backbone traffic-engineering service-instance <pbb-tesid(1-4294967295)>
```

Syntax Description	pbbte-sid - Traffic-engineering service-instance identifier. This value ranges between 1 and 4294967295.
Mode	Switch Configuration Mode
Package	Metro
Example	iss(config-switch)# backbone traffic-engineering service-instance 1 iss(config-switch-tesi)#
Related Command	show backbone traffic-engineering service-instance - Displays TESI and associated ESP with the outgoing ports.

27.4 ethernet-switched-path

This command creates an ESP in a TESI, maps it to a virtual context. The no form of the command deletes the given ESP from a TESI entry.

```
ethernet-switched-path <esp-index(1-4294967295)> destination-address
<aa:aa:aa:aa:aa:aa> source-address <aa:aa:aa:aa:aa:aa> vlan <vlan-id(1-4094)>
```

```
no ethernet-switched-path <esp-index(1-4294967295)>
```

Syntax Description	esp-index	- Ethernet switched path index. This value ranges between 1 and 4294967295.
	destination-address	- Destination MAC Address of the ESP.
	source-address	- Source MAC Address of the ESP.
	vlan-id	- VLAN ID that has been allocated as an ESP VLAN. This value ranges between 1 and 4094.
Mode	TE Service Instance Mode	
Package	Metro	
Example	<pre>iss(config-switch-tesi)# ethernet-switched-path 23589 destination-address 00:11:22:33:44:55 source-address 00:22:33:44:55:66 vlan 12</pre>	
Related Command	show backbone traffic-engineering service-instance ethernet-switched-path - Displays TESI and associated ESP with the outgoing ports.	

27.5 debug backbone traffic-engineering

This command sets the debug level. The no form of the command sets the debug level to default value.

```
debug backbone traffic-engineering {global | [[initshut] [mgmt] [data] [ctpl]  
[dump] [os] [failall] [buffer] [all]] switch <context_name>}
```

```
no debug backbone traffic-engineering {globals | [[initshut] [mgmt] [data]  
[ctpl] [dump] [os] [failall] [buffer] [all]] switch <context_name>}
```

Syntax	global	- Global traces
	initshut	- Init and Shutdown traces
Description	mgmt	- Management traces
	data	- Data Path traces
	ctpl	- Control Plane traces
	dump	- Packet Dump traces
	os	- Traces related to all Resources except Buffer
	failall	- All Failure traces
	buffer	- Buffer allocation/release traces
	all	- All traces
	switch	- Switch/Context name. This is specific to Multiple Instance.
Mode	User Exec Mode	
Package	Metro	
Example	iss# debug backbone traffic-engineering initshut	

27.6 show backbone traffic-engineering status

This command displays PBBTE start/shutdown status, ESP counters and max-limits.

show backbone traffic-engineering status [switch <context_name>]

Syntax Description **switch** - Switch/Context name. This is specific to Multiple Instance.

Mode User Exec Mode

Package Metro

Example iss# show backbone traffic-engineering status

```
Switch default
```

```
Module status           : ShutDown
Total Number of ESPs Created : 0
Total Number of ESPs Active  : 0
Total Number of ESPs Deleted : 0
```

```
Switch 1
```

```
Module status           : Started
Total Number of ESPs Created : 10
Total Number of ESPs Active  : 10
Total Number of ESPs Deleted : 0
```

27.7 show backbone ethernet-switched-path vlans

This command displays ESP VLANs.

show backbone ethernet-switched-path vlans [switch <context_name>]

Syntax Description	switch	- Switch/Context name. This is specific to Multiple Instance.
---------------------------	---------------	---

Mode	User Exec Mode
-------------	----------------

Package	Metro
----------------	-------

Example	iss# show backbone ethernet-switched-path vlans
----------------	---

```
Switch 1
```

```
    ESP Vlan : 2,4,6,22
```

```
Switch 2
```

```
    ESP Vlan : 10
```

27.8 show backbone traffic-engineering service-instance

This command displays TESI and associated ESP with the outgoing ports.

```
show backbone traffic-engineering service-instance [id <te-sid(1-42947295)>
[ethernet-switched-path <esp-index(1-4294967295)>]] [detail]
```

Syntax Description	te-sid	- Traffic engineering service-instance identifier. This value ranges between 1 and 4294967295.
	esp-index	- Ethernet switched path index. This value ranges between 1 and 4294967295.
	detail	- Displays outgoing ports information.

Mode User Exec Mode

Package Metro

Example iss# show backbone traffic-engineering service-instance

NV - Non-Volatile V - Volatile P - Permanent O - Other RO - Read-Only

TeSid Status	EspIndex	Destination Mac	Source Mac	Vlan	Switch
-----	-----	-----	-----	----	-----
1	1	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	2	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	3	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	4	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	5	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
2	6	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
2	7	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
2	8	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
2	9	01:11:22:33:44:55	00:22:33:44:55:66	4	1
NV					
2	10	01:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					

iss# show backbone traffic-engineering service-instance id 1

NV - Non-Volatile V - Volatile P - Permanent O - Other RO -

Read-Only

TeSid Status	EspIndex	Destination Mac	Source Mac	Vlan	Switch
-----	-----	-----	-----	----	-----
1	1	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	2	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	3	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	4	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					
1	5	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					

```
iss# show backbone traffic-engineering service-instance id 1
ethernet-switched-path 1
```

NV - Non-Volatile V - Volatile P - Permenant O - Other RO -
Read-Only

TeSid Status	EspIndex	Destination Mac	Source Mac	Vlan	Switch
-----	-----	-----	-----	----	-----
1	1	00:11:22:33:44:55	00:22:33:44:55:66	2	1
NV					

```
iss# show backbone traffic-engineering service-instance id 1
ethernet-switched-path 1 detail
```

TESID 1

```
-----
ESP-ID          : 1/1
Destination Mac  : 00:11:22:33:44:55
Source Mac      : 00:22:33:44:55:66
VlanID          : 2
Virtual-Switch   : switch 1
Status          : Non-Volatile
Egress Port(s)  :
```

```
iss# show backbone traffic-engineering service-instance id 1
detail
```

TESID 1

```
-----
ESP-ID          : 1/1
Destination Mac  : 00:11:22:33:44:55
Source Mac      : 00:22:33:44:55:66
VlanID          : 2
```

```

Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```

```

-----
ESP-ID         : 1/2
Destination Mac : 00:11:22:33:44:55
Source Mac     : 00:22:33:44:55:66
VlanID        : 2
Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```

```

-----
ESP-ID         : 1/3
Destination Mac : 00:11:22:33:44:55
Source Mac     : 00:22:33:44:55:66
VlanID        : 2
Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```

```

-----
ESP-ID         : 1/4
Destination Mac : 00:11:22:33:44:55
Source Mac     : 00:22:33:44:55:66
VlanID        : 2
Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```

```

-----
ESP-ID         : 1/5
Destination Mac : 00:11:22:33:44:55
Source Mac     : 00:22:33:44:55:66
VlanID        : 2
Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```

Number of ESPs in this TESID is 5

```

iss# show backbone traffic-engineering service-instance id 1
ethernet-switched-path 1 detail

```

TESID 1

```

-----
ESP-ID         : 1/1
Destination Mac : 00:11:22:33:44:55
Source Mac     : 00:22:33:44:55:66
VlanID        : 2
Virtual-Switch : switch 1
Status         : Non-Volatile
Egress Port(s) :

```